

Teaching Theory of Knowledge

Edited by Marjorie A. Clay



Council for Philosophical Studies

Teaching Theory of Knowledge

**A Publication Developed at the 1986 NEH Summer
Institute on the Theory of Knowledge**

edited by
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A Teaching Aid

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PREFACE

This document grew out of the work of the 1986 Summer Institute on Theory of Knowledge, sponsored by the Council for Philosophical Studies and funded by the National Endowment for the Humanities. Many individuals and institutions contributed to the success of this Summer Institute, but the Council's main debt of gratitude is owed Alvin Goldman and Keith Lehrer for their intellectual and organizational leadership. I want to express my personal appreciation for a job well done and for the exceptionally cooperative attitude they brought to the solving of sometimes complex administrative problems. The Council also appreciates the contributions of the other staff members of the Institute.

The Council wishes to gratefully acknowledge the contribution of the staff and participants to the production of this document, which will allow us to disseminate the results of the Institute to a much larger audience. A very special acknowledgement is due Marjorie Clay, who not only edited the volume but also produced the camera-ready copy.

The Council wishes to acknowledge with gratitude the continuing support of Council projects provided by the National Endowment for the Humanities. This particular project was funded under grant number EH-20572-85.

This document is provided without charge so the work of the Institute on Theory of Knowledge will be available to a wider audience. Those receiving the document are encouraged to share it with their colleagues. Additional copies may be obtained by writing to the Council, 203 Dodd Hall, Florida State University, Tallahassee, FL 32306. Jules Coleman is the new Executive Secretary of the Council and he should be contacted regarding any other Council matters at the School of Law, Yale University, New Haven, CT 06520.

Alan Mabe



FOREWORD

The Summer Institute in the Theory of Knowledge was held for eight weeks in the Summer of 1986 under the auspices of the Council for Philosophical Studies supported by a grant from the National Endowment for the Humanities. The Institute included a large number of lecturers who represented the major approaches to epistemology as well as the principal connections between epistemology and other fields of inquiry. One task of the Institute was to prepare an educational booklet of use to the profession. The participants in the Institute were a very diverse and very talented group of philosophers. They had a wide variety of interests and taught in a wide variety of private and public institutions. It was clear that they had a great deal to contribute to an educational booklet on the Theory of Knowledge, and we set out, during the last half of the Institute, to use their skills and information to produce a pedagogical tool for the profession.

It became clear early in the process that our booklet would divide in a way that reflected the special skills of the participants and the perceived needs of the profession. There was need to present the contemporary materials that might be used in a course in epistemology in such a way that a teacher could assemble his or her course in an efficient way. Hence the Contemporary Sources section of the booklet. We thought other teachers would prefer more historical material and included a Historical Sources section. We know that not all teachers interested in epistemology would have the luxury of teaching upper division courses in epistemology, and, consequently, we sought to provide information as to how epistemology might be taught at the lower levels and how materials from epistemology might be used to construct a beginning course in philosophy. Finally, it was a major theme of the Institute that epistemology was connected with work in other fields, and we attempted to show how to construct courses that constitute bridges between the theory of knowledge and other fields. We have included modules, bibliography, sample courses, and even some sample assignments to assist and encourage those seeking to present literature from the theory of knowledge to a variety of students of varying levels of preparation and ability.

One of the participants, the editor of the booklet, Dr. Clay, showed a special interest in coordinating the effort to get us working to produce the booklet. It soon became clear that she also had the very special ability to make the effort succeed. We, of course, gave her our complete support, but it was her extraordinary leadership and determination as well as her editorial and pedagogical skills that drove the project to completion. We wish to express our deep gratitude to all the participants for their work and cooperation in this undertaking, but especially to Dr. Clay for facilitating our working together on the booklet in the

last weeks of the Institute. We sought to articulate the knowledge we had obtained during the Institute to present this booklet to our colleagues in the profession. It was Dr. Clay who welded it into a coherent whole.

We should like to express our thanks to the participants and lecturers for their contributions to the success of the Institute, to Mylan Engel for his efficient service as our assistant at the Institute, and to Rosalee Burkart for her efficient secretarial service during the course of the Institute. We should like to express our special thanks to the National Endowment for the Humanities for funding the Institute, to the members of the Council for Philosophical Studies for sponsoring the Institute, and to Alan Mabe, former Secretary-Treasurer of the Council, for his effective administration of matters pertaining to the grant.

Alvin Goldman
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ABOUT THE BOOKLET

*In order to understand anything, one must understand everything;
in order to say anything, one must leave out a great deal.*

Simone de Beauvoir

Simone de Beauvoir's words aptly describe the dilemma we found ourselves in as we undertook this project. The total immersion in epistemology that the Institute represented seemed at times like an attempt to understand everything; preparing this curriculum booklet brought us face to face with multiple decisions about what to leave out. In the end, we compromised, and settled for a highly selective, perhaps idiosyncratic set of modules, with sample syllabi to illustrate how the modules might be combined to create a variety of Theory of Knowledge courses.

In units where the issues are treated in considerable detail and where the material cited is extensive, we have arranged the readings to follow the subsection where they are discussed; otherwise, readings are listed in alphabetical order and follow the module itself. In an effort to limit the repetition of essential bibliographical information of standard epistemological works mentioned in the Sample Courses, we generally listed only the title and the author of the work in question; full bibliographical data may be found in the appropriate module or subdivision. In units where material is being used in somewhat different ways than might be expected (i.e., Epistemology: The First Course), or where the material cited may not be as well-known to epistemologists as more traditional materials (i.e., Epistemology: Bridge Courses), groups have adopted various conventions for helping teachers assess the kinds of resources available. These conventions are described in the introductory sections which precede their use; they represent the judgment and preferences of their authors, and not necessarily a consensus among Institute participants.

This booklet has been designed to be *used*. Each righthand page header is keyed to the Contents and most units include a brief outline with page numbers of the topics that appear in that unit. Cross references between modules have been provided to assist you in creating courses that may cut across more conventional boundaries between areas. In addition, we have included a section devoted exclusively to building connections between epistemology and other cognate areas, such as philosophy of science, cognitive psychology, and probability theory. Finally, we have pooled our resources in a section that describes some of the pedagogical innovations various participants have tried at

their respective institutions, and have included sample questions and assignments taken from a variety of different courses.

In all of these sections, we offer our work as a starting-point, not as a final, or finished, document. Use these materials to think about what is involved in teaching epistemology; change them, supplement them, combine them, go beyond them. It is our hope that you will find something here that will help you pursue excellence in teaching theory of knowledge. No matter what our epistemological positions, that is a goal which we all can share.

Marjorie Clay

CONTEMPORARY SOURCES FOR TEACHING EPISTEMOLOGY

CONTRIBUTORS: Jack Bender, Stewart Cohen, Richard Feldman, Alan Goldman, Alvin Goldman, John Heil, Noah Lemos, G. J. Mattey, Mike Roth, Jonathan Vogel.

FOURTEEN MODULES

In this unit there are modules describing fourteen topics that are central to recent and contemporary epistemology. Each module contains a brief description of the topic and a list of readings. The topics are:

1. The Traditional Analysis of Knowledge (p. 2)
2. Skepticism (p. 3)
3. The Gettier Problem (p. 4)
4. Foundationalism (p. 7)
5. Coherentism (p. 9)
6. Reliabilism (p. 11)
7. Explanationism (p. 12)
8. Memory (p. 13)
9. Perception (p. 15)
10. *A Priori* Knowledge (p. 16)
11. Naturalistic Epistemology (p. 23)
12. Realism (p. 25)
13. Rationality (p. 26)
14. Epistemic Logic (p. 28).

These modules can be used as the basis for designing a wide variety of courses on contemporary epistemology. Some of the modules fit together into units that could easily constitute an entire course or a large portion of a course. For example, modules (4) - (7) concern theories of epistemic justification. Modules (8) - (10) concern sources of knowledge. Each module contains only a small part of the literature on its topic and could easily be expanded so that entire courses might be based on just a few of the modules. Many of the anthologies mentioned contain additional readings and bibliographies that might be used for this purpose. It is also likely that some instructors will choose to use some of these modules in conjunction with topics discussed elsewhere in this booklet.

2 CONTEMPORARY SOURCES FOR TEACHING EPISTEMOLOGY

1. The Traditional Analysis of Knowledge

When Gettier published his famous paper "Is Justified True Belief Knowledge?" in 1963, it was thought in some philosophical quarters that he had destroyed a long-standing "tradition" in epistemology regarding the correct analysis or definition of knowledge. This traditional view which certain philosophers trace back to Plato's *Theaetetus*, claims that what distinguishes knowledge from mere true opinion and/or lucky guess is that the former but not the latter is based upon some form of justification: hence, the notion that knowledge is nothing other than justified true belief. Gettier himself may have unwittingly lent further support to the idea that this view of knowledge dates back to Plato by citing two then current conceptions of knowledge, each held by a leading epistemologist of the day and each in seeming agreement with the major elements of the Platonic conception. Whatever the reality of the tradition, no philosopher since Gettier has seriously and successfully defended this so-called traditional view.

Cross References

For additional readings on the relationship between the so-called "Traditional Analysis of Knowledge" and the Gettier problem, see also "The Gettier Problem" in this section (pp. 4-7).

For a brief discussion of whether the "Justified True Belief" account of knowledge should be attributed to Plato, see also "Theory of Knowledge in Ancient Philosophy" in the "Historical Sources" section (pp. 35-39).

Readings

Ayer, A. J. *The Problem of Knowledge*. Middlesex, England: Pelican Books, 1984.

Chisholm, R. *The Foundations of Knowing*. Minneapolis: University of Minnesota Press, 1983.

Chisholm, R. *Perceiving: A Philosophical Study*. Ithaca: Cornell University Press, 1961.

Lehrer, K. *Knowledge*. Oxford: Clarendon Press, 1974. See especially chapters 1-3.

MacGiver, P. M. "Presidential Address." *Proceedings of the Aristotelian Society*. 1959.

Plato. *Theaetetus*.

Russell, B. *Human Knowledge, Its Scope and Limits*. New York: Simon and Schuster, 1948.

Russell, B. *Our Knowledge of the External World*. London: George Allen and Unwin, Ltd., 1926.

2. Skepticism

Skepticism about the external world is traditionally a central concern of epistemology, and it is the subject of a great deal of current research. The problem of skepticism is that we seem to be committed to propositions that make up an inconsistent triad, i.e., (1) Each of us does know various things about the external world; (2) In order to know these things, we have to know that we aren't always dreaming (or, that we aren't continually deceived by something like an evil demon); and (3) We don't know that we aren't dreaming (or being deceived).

The classical source for skeptical arguments is Descartes' First Meditation; more modern versions are found in Unger and Lehrer. Various forms of skepticism may follow from these arguments. These are distinguished and characterized in Klein, Goldman, and Pappas.

Throughout this century, the resources of linguistic philosophy have been deployed in efforts to refute skepticism or to dissolve the problem it seems to pose. The writings of Moore, Wittgenstein, Austin, and Bouwsma have been extremely influential. (There is a useful survey of much of this material in the paper by the Blumenfelds). Currently, a great deal of attention has been focused on attempts to escape skepticism by rejecting (2) above (see here Dretske and Nozick). Also notable is Peter Klein's attack on (3). Other recent work has been concerned with the metaphilosophical implications of skepticism (as in Stroud and Cavell).

Cross Reference

For a brief account of the development of skepticism, see also "Skepticism" in the "Historical Sources" section (pp. 40-45).

Readings

Austin, J. L. "Other Minds." In his *Philosophical Papers*. Oxford: Oxford University Press, 1962.

Blumenfeld, D. and J. B. "Can I Know That I Am Not Dreaming?" In Hooker, M. (ed.), *Descartes: Critical and Interpretative Essays*. Baltimore: Johns Hopkins University Press, 1978.

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Bouwisma, O. K. "Descartes' Evil Genius." *Philosophical Review* 58 (1949), 141-51.

Cavell, S. *The Claim of Reason*. Oxford: Oxford University Press, 1979. See especially Parts I and II.

Descartes, R. *Meditations*. Haldane and Ross. (tr.). Cambridge: Cambridge University Press, 1977.

Dretske, F. "Epistemic Operators." *Journal of Philosophy* 67 (1970), 1007-23.

Goldman, A. I. *Epistemology and Cognition*. Cambridge, Mass.: Harvard University Press, 1986. See especially chapter 2.

Klein, P. *Certainty: A Refutation of Skepticism*. Minneapolis: University of Minnesota Press, 1981.

Lehrer, K. "Why Not Skepticism?" In Pappas and Swain.

Moore, G. E. "Certainty." In his *Philosophical Papers*. New York: Humanities Press, 1970.

Nozick, R. *Philosophical Explanations*. Cambridge, Mass.: Harvard University Press, 1981.

Pappas, G. "Some Forms of Epistemological Skepticism." In Pappas and Swain.

Stroud, B. *The Significance of Philosophical Scepticism*. Oxford: Oxford University Press, 1984.

Unger, P. "A Defense of Skepticism." In Pappas and Swain (eds.), *Essays on Knowledge and Justification*. Ithaca: Cornell University Press, 1978. Hereafter cited as 'Pappas and Swain'. See also his *Ignorance*, Oxford University Press, 1975.

Wittgenstein, L. *On Certainty*. Oxford: Basil Blackwell, 1969.

3. The Gettier Problem

The Gettier Problem arises out of a defect in the so-called traditional analysis of knowledge brought to the attention of epistemologists by Edmund Gettier in his 3-page paper in *Analysis* in 1963. According to the tra-

ditional analysis, what distinguishes knowledge from mere true opinion is that knowledge rests on some form of justification. Thus, knowledge is said to be justified true belief. Gettier showed in his brief paper that there are cases of justified true belief that clearly are not cases of knowledge, and hence that the traditional analysis is defective.

The response to Gettier's paper has been overwhelming. At first, some philosophers argued that he had failed to show that the traditional analysis was defective. The most prevalent response, however, has been to propose one or another additional requirement on knowledge. Causal theorists hold that knowledge requires that there be an appropriate causal connection between the belief and the fact the belief is about. Defeasibility theorists say, roughly, that a person lacks knowledge of a proposition, *p*, when there is some truth such that, if the person knew it, s/he would not be justified in believing *p*. Others have argued that one knows a proposition only if one's evidence for that proposition justifies no falsehoods. The readings listed below are representative of these and other important responses to the Gettier Problem. It is clear that at this time there is no generally accepted solution.

Cross References

For additional readings on the relationship between the Gettier problem and the traditional analysis of knowledge, see "The Traditional Analysis of Knowledge" in this section (pp. 2-3).

For an account of the relationship between epistemology and philosophy of science, and for a discussion of the importance of the Gettier problem to that relationship, see the sample course "Epistemology and the Philosophy of Science" in the "Bridge Courses" section (pp. 92-101).

Readings

Three anthologies contain excellent selections of readings on the Gettier problem:

Moser, P. and vander Nat, A. (eds.). *Human Knowledge: Classical and Contemporary Approaches*. New York: Oxford University Press, 1987. Hereafter cited as 'Moser and vander Nat'.

Pappas, G. S. and Swain, M. (eds.). *Essays on Knowledge and Justification*. Ithaca: Cornell University Press, 1978. Hereafter cited as 'Pappas and Swain'.

Roth, M. D. and Galis, L. (eds.). *Knowing: Essays in the Analysis of Knowledge*. New York: Random House, 1970.

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Second edition published by University Press of America, 1984.
Hereafter cited as 'Roth and Galis'.

The papers in the Pappas and Swain volume are, in general, more difficult than those in the Roth and Galis volume. Another volume which summarizes the literature on the Gettier problem is:

Shope, R. K. *The Analysis of Knowing: A Decade of Research*. Princeton, N. J.: Princeton University Press, 1983.

The following papers are important contributions to the literature on the Gettier Problem. Many equally important papers are omitted. The Shope volume mentioned above contains an excellent bibliography.

Armstrong, D. M. *Belief, Truth and Knowledge*. New York, London: Cambridge University Press, 1973. See especially chapters 10 and 11.

Chisholm, R. *Theory of Knowledge*. 2nd edition. Englewood Cliffs, N. J.: Prentice-Hall, 1977.

Dretske, F. "Conclusive Reasons." *Australasian Journal of Philosophy* 49, 1-22. Reprinted in Pappas and Swain.

Feldman, R. "An Alleged Defect in Gettier Counter-Examples." *Australasian Journal of Philosophy* 52, 68-69. Reprinted in Moser and vander Nat.

Gettier, E. "Is Justified True Belief Knowledge?" *Analysis* 23, 121-123. Reprinted in Roth and Galis and in Moser and vander Nat.

Goldman, A. I. "A Causal Theory of Knowing." *Journal of Philosophy* 64, 357-72. Reprinted in Roth and Galis and in Pappas and Swain.

Goldman, A. I. "Discrimination and Perceptual Knowledge." *Journal of Philosophy* 73, 771-91. Reprinted in Pappas and Swain, and in Moser and vander Nat.

Harman, G. *Thought*. Princeton: Princeton University Press, 1973. Selections reprinted in Pappas and Swain.

Kaplan, M. "It's Not What You Know That Counts." *Journal of Philosophy* 82, 350-63.

Klein, P. "A Proposed Definition of Propositional Knowledge." *Journal of Philosophy* 68, 471-82.

Klein, P. "Knowledge, Causality, and Defeasibility." *Journal of Philosophy* 73, 397-413.

Lehrer, K. *Knowledge*. London: Oxford University Press, 1974. See especially chapters 1 and 9.

Lehrer, K. and Paxson, T., Jr. "Knowledge: Undefeated Justified True Belief." *Journal of Philosophy* 66, 225-37. Reprinted in Pappas and Swain.

Shope, R. K. "The Conditional Fallacy in Contemporary Philosophy." *Journal of Philosophy* 75, 397-413.

Sosa, E. "How Do You Know?" *American Philosophical Quarterly* 11, 113-22. Reprinted in Pappas and Swain.

Swain, M. "Reasons, Causes and Knowledge." *Journal of Philosophy* 75, 229-49.

Swain, M. *Reasons and Knowledge*. Ithaca: Cornell University Press, 1981.

Thalberg, I. "In Defense of Justified True Belief." *Journal of Philosophy* 66, 794-803.

Unger, P. "An Analysis of Factual Knowledge." *Journal of Philosophy* 65, 157-70. Reprinted in Roth and Galis.

4. Foundationalism

Foundationalism in the theory of knowledge comes in many forms. In general, Foundations theories are characterized by the thesis that there exists a class of beliefs which have some degree of justification that does not derive from relations to other beliefs. These beliefs, often called basic beliefs, typically are held to have some status ranging from incorrigible to *prima facie* justified. The basic beliefs serve as the foundations, i.e., all justified non-basic beliefs are justified in virtue of relations they bear to the basic ones.

Chisholm (1977, 1980) and Pollock (1974) have provided the most systematic exposition and defense of Foundationalism. Discussions of the types of status basic beliefs might be said to have can be found in Alston (1971) and Pollock (1979). Many critics of Foundationalism attack the notion of a basic belief, e.g., Sellars (1979), Lehrer (1974), Bonjour (1978). For a

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defense of basic beliefs, see Alston (1976), Van Cleve (1979, 1985), and Sosa (1980). General discussions of Foundations theories as they contrast with Coherence theories can be found in Lehrer (1974), Pollock (1979) and Sosa (1980).

Readings

Alston, W. "Varieties of Privileged Access." *American Philosophical Quarterly* 8, (1971), 221-41.

Alston, W. "Two Types of Foundationalism." *Journal of Philosophy* 73, (1976), 1965-85. Reprinted in Moser (ed.), *Empirical Knowledge*. Rowman and Littlefield, 1986. Hereafter cited as 'Moser'.

BonJour, Laurence. "Can Empirical Knowledge Have a Foundation?" *American Philosophical Quarterly* 15, (1978), 1-13. Reprinted in Moser.

Chisholm, R. *Theory of Knowledge* (2nd ed.). Englewood Cliffs, N. J.: Prentice-Hall, 1977.

Chisholm, R. "A Version of Foundationalism." *Midwest Studies in Philosophy* Vol. 5. University of Minnesota, 1980. In Moser, P. and vander Nat, A. (eds.), *Human Knowledge: Classical and Contemporary Approaches*. New York: Oxford University Press, 1987. Hereafter cited as 'Moser and vander Nat'.

Lehrer, K. *Knowledge*. Oxford, 1974. See especially chapters 4-6.

Pollock, J. *Knowledge and Justification*, Princeton, 1974.

Pollock, J. "A Plethora of Epistemological Theories." In Pappas G. (ed.), *Justification and Knowledge*. Reidel, 1979, 93-113.

Sellars, W. "More on Givenness and Explanatory Coherence." In Pappas *op. cit.*, 1979.

Sosa, E. "The Raft and the Pyramid: Coherence versus Foundations in Theory of Knowledge." In French *et. al.* (eds.), *Midwest Studies in Philosophy*, 1980, 3-27. Also reprinted in Moser, and in Moser and vander Nat.

Van Cleve, J. "Foundationalism, Epistemic Principles and the Cartesian Circle." *Philosophical Review* 88, (1979), 55-91.

Van Cleve, J. "Epistemic Supervenience and the Circle of Belief." *Monist* 68, (1985), 90-104.

5. Coherentism

Coherence theories of epistemic justification have enjoyed in recent years an increase in sophistication and a resurgence in popularity. Coherence theories, in general, hold that whatever degree of justification a proposition or belief has for a person it has in virtue of certain relations it bears to other things which that person believes. A belief is justified, then, only if it coheres in some specifiable way and to some specifiable degree with the body of other beliefs accepted by the believer. Certain features of coherence theories set them apart from other accounts of justification such as foundationalism and reliabilism. For example, coherentists reject the view that some propositions or beliefs are in any degree "self-warranted", i.e., that they enjoy some degree of justification independently of the relations they bear to other beliefs. Moreover, coherentists generally maintain that something which is not a belief cannot, by itself, confer any justification upon a proposition or a belief. Neither sensory states alone, nor the fact that a belief is the product of a reliable belief-forming process, can confer justification, according to the coherentist.

Keith Lehrer's *Knowledge* (1974) and Laurence Bonjour's *The Structure of Empirical Knowledge* (1985) are two of the most systematic attempts to present and defend some form of the coherence theory. Many sympathetic treatments of coherence theories contain arguments against other accounts of justification; the papers listed below by Ernest Sosa and William Alston contain responses to some of the main arguments advanced by coherentists against foundationalism. Sosa's paper also contains a critical examination of the traditional arguments in support of coherence theories. A critical survey of various coherence theories can also be found in John Pollock's *Contemporary Theories of Knowledge* (1986).

Readings

Alston, W. "Has Foundationalism Been Refuted?"
Philosophical Studies 29 (1976), 287-305.

BonJour, L. "The Coherence Theory of Empirical Knowledge."
Philosophical Studies 30 (1976), 281-312. Reprinted in Moser,
(ed.), *Empirical Knowledge*. Rowman and Littlefield, 1986.
Hereafter cited as 'Moser'.

BonJour, L. "Can Empirical Knowledge Have a Foundation?" *American Philosophical Quarterly* 15 (1978), 1-13. Reprinted in Moser.

BonJour, L. "The Elements of Coherentism." Chapter 5 of *The Structure of Empirical Knowledge*. Harvard, 1985, 87-110.

BonJour, L. "A Survey of Coherence Theories." Appendix B, *ibid.*, 1985.

Firth, R. "Coherence, Certainty and Epistemic Priority." *Journal of Philosophy* LXI No. 19, 545-57. Reprinted in Chisholm and Swartz, (eds.), *Empirical Knowledge*, Prentice-Hall, 1973.

Kornblith, H. "Beyond Foundationalism and the Coherence Theory." In H. Kornblith, (ed.), *Naturalizing Epistemology*, Bradford Books, MIT Press, 1986.

Lehrer, K. *Knowledge*, Oxford, 1974. See chapters 7 and 8. (Chapter 8 is reprinted in Pappas, G. and Swain, M., *Essays on Knowledge and Justification*. Cornell, 1978).

Lehrer, K. "Coherence and the Racehorse Paradox." In French et. al., (eds.), *Midwest Studies in Philosophy* Vol. 5. Minneapolis: University of Minnesota, 1980.

Lehrer, K. and Cohen, S. "Justification, Truth and Coherence." *Synthese* 55 (1983), 191-207. In Moser, P. and vander Nat, A. (eds.), *Human Knowledge: Classical and Contemporary Approaches*. New York: Oxford University Press, 1987. Hereafter cited as 'Moser and vander Nat'.

Lehrer, K. "The Coherence Theory of Knowledge." *Philosophical Topics*, Vol. XIV, No. 1 (1986), 5-25.

Pollock, J. *Contemporary Theories of Knowledge*. Totowa: Rowman and Allenheld, 1986.

Pollock, J. "A Plethora of Epistemological Theories." In Pappas, G. (ed.), *Justification and Knowledge*. Dordrecht: Reidel, 1979, 93-113.

Quine, W. V. and Ullian, J. S. *The Web of Belief* (2nd ed.). New York: Random House, 1978.

Sosa, E. "The Raft and the Pyramid: Coherence versus Foundations in Theory of Knowledge." In French *et. al.*, (eds.), *op. cit.* (1980), 3-27. Reprinted in Moser, and in Moser and vander Nat.

6. Reliabilism

The concept of reliability has played a central role in recent theories of justification and knowledge. The basic idea of one prominent version of the reliability theory of justification is that a belief is justified if and only if it is caused by a reliable belief-forming process. For the classical defense of this view, see Goldman, 1979. The other main version of the reliability theory of justification holds that a belief is justified just in case the fact that a belief is held is a reliable indication of its truth (see Swain). For a comparison of these two kinds of reliability theory, see Schmitt. Some reliability theorists avoid reference to justification, but hold that conditions similar to the ones just mentioned are necessary for knowledge. For an early formulation of this view see Armstrong and for a more recent information theoretic version see Dretske.

There have been many critical discussions of reliabilism. Reliabilism seems to have the counter-intuitive consequence that the beliefs of a person deceived by an Evil Demon are all unjustified. This objection is developed by Cohen, Foley, Ginet, and Pollock. It has been argued by Feldman and Pollock that reliabilists are unable to develop satisfactory accounts of a belief-forming process and of reliability in order to make the theory plausible. For a recent attempt to deal with these problems, see Goldman (1986), chapters 3 and 5.

Papers by Alston, Cohen, and Sosa contain good discussions of reliabilism within the context of more general discussions of theories of epistemic justification.

Readings

Alston, W. "Concepts of Epistemic Justification." *The Monist* 68 (1985), 57-85. Reprinted in Moser, (ed.), *Empirical Knowledge*. Rowman and Littlefield, 1986. Hereafter cited as 'Moser'.

Armstrong, D. *Belief, Truth and Knowledge*. Cambridge: Cambridge University Press, 1973.

BonJour, L. "Externalist Theories of Empirical Justification." In P. French, T. Uehling, Jr., and H. Wettstein (eds.), *Midwest Studies in Philosophy* Vol. 5. University of Minnesota, 1980, 53-73.

Cohen, S. "Justification and Truth." *Philosophical Studies* 48 (1984), 3 279-95.

Dretske, F. *Knowledge and the Flow of Information*. Cambridge, Mass.: MIT Press, 1981.

Feldman, R. "Reliability and Justification." *The Monist* 68 (1985), 159-64.

Foley, R. "What's Wrong with Reliabilism?" *The Monist* 68 (1985), 188-202.

Ginet, C. "Contra Reliabilism." *The Monist* 68 (1985), 175-87.

Goldman, A. I. "What is Justified Belief?" In Pappas (ed.), *Justification and Knowledge*. Dordrecht: Reidel, 1979, 1-23. Also reprinted in Moser.

Goldman, A. I. *Epistemology and Cognition*, Cambridge, Mass.: Harvard, 1986, chapters 3 and 5.

Pollock, J. "Reliability and Justified Belief." *The Canadian Journal of Philosophy* 14 (1984), 103-14. Reprinted in Moser.

Schmitt, F. "Justification as Reliable Indication or Reliable Process." *Philosophical Studies* 40 (1983), 409-17.

Sosa, E. "The Raft and the Pyramid: Coherence versus Foundations in the Theory of Knowledge". In French *et. al.* (eds.), *op. cit.*, 1980, 3-27. Also in Moser, and in Moser and vander Nat.

Swain, M. "Justification and Reliable Belief." *Philosophical Studies* 40 (1981), 389-407.

7. Explanationism

An alternative approach to the analyses of both knowledge and justification appeals to the concept of inference to the best explanation. The explanationist analysis of knowledge holds that *S* knows that *p* when *p* enters into the best explanation for *S*'s having the belief that *p*. Similarly *S* is said to be justified in believing *p* when that belief is inferred as part of the best explanation for evidence that *S* has, or when it is part of a system of beliefs that maximizes explanatory coherence.

In the suggested readings Alan Goldman presents the explanationist analysis of knowing and suggests an account of foundational beliefs as self-explanatory. J. W. Comman appeals to explanatory coherence as the source of justification beyond (more traditionally construed) foundations. Gilbert Harman uses intuitions regarding knowledge to construct a theory of inference and justification based on inference to the best explanation. Roderick Chisholm opposes the equation of justification with explanatory coherence. Keith Lehrer offers an account of self-explanation and explanatory coherence, but holds the latter insufficient for justification.

Cross Reference

For a brief discussion of the origins of this account of knowledge, see "Theory of Knowledge in Ancient Philosophy" in the "Historical Sources" section (pp. 35-39).

Readings

Chisholm, R. *The Foundations of Knowing*. Minneapolis, 1980. See especially pages 31-32.

Comman, J. *Skepticism, Justification, and Explanation*. Dordrecht, 1980. See especially chapter 7.

Goldman, A. H. "An Explanatory Analysis of Knowledge." *American Philosophical Quarterly* 21 (1984), 101-8.

Harman, G. *Change in View*. Cambridge, Mass.: 1986. See especially chapter 7.

Harman, G. *Thought*. Princeton: Princeton University Press, 1973. See especially chapters 7 and 8.

Lehrer, K. *Knowledge*. Oxford, 1974. See especially chapter 7.

8. Memory

Traditionally memory has been regarded not as a *source* of knowledge but as a channel linking beliefs acquired—or experiences had—at one time to their recall at some later time. Most theorists take some causal connection between a memory and the remembered fact or episode to be a necessary condition for remembering. Such connections are standardly thought to require a storage medium or *trace* in which memories are laid down and preserved for later retrieval. The classical expression of the view can be found in Plato's *Theaetetus*. A more sophisticated version is defended by Martin and Deutscher (cf. Heil, Malcolm, Squires for criticisms).

Work on memory has tended to focus either on the character of mnemonic mechanisms (as in the sources mentioned above), or on the role of memory in knowing and in justified believing (see Ginet, Naylor, Pollock). Recently, philosophers inclined in the direction of "naturalized" epistemology have suggested that psychological accounts of memory have much to tell us that is relevant to the epistemological enterprise (see, e.g., Cherniak, Goldman; a survey of recent empirical work in the psychology of memory may be found in Anderson).

Cross Reference

For additional materials on the role of memory in epistemology, see the sample courses in the "Bridge Courses: Epistemology and Psychology" section (pp. 79-92).

Readings

Anderson, J. R. *Cognitive Psychology* (2nd ed.). New York: W. H. Freeman and Co., 1985. See especially chapters 6 and 7.

Benjamin, B. S. "Remembering." *Mind* 65 (1956), 312-31.

Cherniak, C. "Rationality and the Structure of Human Memory." *Synthese* 57 (1983), 163-86.

Ginet, C. *Knowledge, Perception and Memory*. Dordrecht: Reidel Publishing Co., 1975.

Goldman, A. I. *Epistemology and Cognition*. Cambridge, Mass.: Harvard University Press, 1986. See especially chapter 10.

Heil, J. "Traces of Things Past." *Philosophy of Science* 45 (1978), 60-72.

Lewis, C. I. *Analysis of Knowledge and Valuation*. La Salle, Ill.: Open Court, 1946. See especially chapter 11.

Locke, D. *Memory*. New York: Doubleday Anchor Books, 1971.

Malcolm, N. "Three Lectures on Memory." In *Knowledge and Certainty*. Englewood Cliffs, N.J.: Prentice-Hall, 1963.

Malcolm, N. *Memory and Mind*. Ithaca: Cornell University Press, 1977.

Martin, C. B. and Deutscher, M. "Remembering." *Philosophical Review* 75 (1966), 161-96.

Naylor, A. "Remembering Without Knowing--Not Without Justification." *Philosophical Studies* 49 (1986), 295-311.

Pollock, J. L. *Knowledge and Justification*. Princeton: Princeton University Press, 1974. See especially chapter 7.

Squires, R. "Memory Unchained." *Philosophical Review* 77 (1969), 178-96.

9. Perception

Although it is clear that perceiving is epistemologically central, there is considerable disagreement--stemming from disagreement over the character of perception--about why this is so. Traditional theories regard perceiving as essentially sensational: to perceive is to be in some conscious sensory state (see, e.g., A. H. Goldman). Such sensory states stand in certain relations, on the one hand to objects and events "in the world," and, on the other hand, to nonsensory cognitive states of perceivers. Causal theorists suppose that sensory states are caused by external goings-on, and that it is in virtue of this that epistemic connections between perceptual beliefs and external states of affairs are possible (see, e.g., Dretske, Jackson). Phenomenalists envisage a more intimate connection: sensory states comprise ordinary objects (see, e.g., Price). Adverbial theorists, in contrast, take sensory episodes to be nonrelational: to perceive a cat, for instance, is *inter alia*, to have a certain *sort* of sensory experience, to *sense catly* (see Chisholm, Tye). The idea is to avoid, if possible, the positing of specialized sensible entities.

Less traditional theorists disdain any bifurcation of sensory and epistemic states. They contend that perceiving consists essentially in being caused--by objects perceived--to be in certain cognitive belief-like states (Armstrong, Heil). The occurrence of sensory episodes is, on such a view, a contingent feature of perceiving. Perceivers undergoing identical sensory experiences may nevertheless perceive differently.

The move to naturalize epistemology has resulted in philosophers coming to take more seriously empirical work in psychology and the physiology of perception (see Anderson, chapter 3, for background information on recent work in psychology; and A. I. Goldman, chapter 9, for an application of such work to matters of epistemological concern).

Cross Reference

For additional readings on the role of perception in epistemology, see the sample courses in the "Bridge Courses: Epistemology and Psychology" section (pp. 79-92).

Readings

Anderson, J. R. *Cognitive Psychology* (2nd ed.). New York: W. H. Freeman and Co., 1985. See especially chapter 3.

Armstrong, D. M. *Perception and the Physical World*. London: Routledge & Kegan Paul, 1961.

Chisholm, R. M. *Perceiving: A Philosophical Study*. Ithaca: Cornell University Press, 1961.

Dretske, F. I. *Knowledge and the Flow of Information*. Cambridge, Mass.: MIT Press/Bradford Books, 1981.

Dretske, F. I. *Seeing and Knowing*. London: Routledge & Kegan Paul, 1969.

Goldman, A. H. "Appearing as Irreducible in Perception." *Philosophy and Phenomenological Research* 37 (1976), 147-64.

Goldman, A. I. *Epistemology and Cognition*. Cambridge, Mass.: Harvard University Press, 1986. See especially chapter 9.

Heil, J. *Perception and Cognition*. Berkeley: University of California Press, 1983. See especially chapter 3.

Jackson, F. *Perception: A Representative Theory*. Cambridge: Cambridge University Press, 1977.

Pollock, J. L. *Knowledge and Justification*. Princeton: Princeton University Press, 1974. See especially chapter 3.

Price, H. H. *Perception*. London: Methuen, 1932.

Tye, M. "The Adverbial Approach to Visual Experience." *Philosophical Review* 93 (1984), 195-225.

Wright, E. "Recent Work in Perception." *American Philosophical Quarterly* 21 (1984), 17-30.

10. A Priori Knowledge

Since most of the issues involved in this module require a grasp of elementary symbolic logic, we recommend that an introductory logic course be required as a prerequisite to any course emphasizing these issues.

Literally construed, '*a priori*' is an adverb which means 'in a manner which is independent of experience'. Thus one may be said to reason or know *a priori*. However, the term is also used adjectivally to describe a *type* of knowledge, that is, knowledge which is gained independently of sense experience. Although it is possible to conceive a number of non-sensible modes of knowledge (e.g., mystical insight, prescience), the module will be restricted to knowledge gained by *reason*, somehow independently of the information provided by the senses. The types of knowledge can be divided according to well-known means of classifying the kinds of *propositions* said to be known *a priori*. Some kinds of allegedly *a priori* knowledge, most notably mathematical knowledge, must also be given a proper place in the classification. Finally, the classification itself can be called into question.

Division of the field:

1. Reason as a Source of Knowledge
 - A. Innate Ideas
 - B. Logical rules
2. Types of Knowledge
 - A. Necessary truths
 1. Analytic truths
 - a. Propositions of logic
 - b. Propositions true by virtue of meaning
 - c. Framework principles
 2. Synthetic propositions
 - B. Contingent truths
3. A Special Case of *A Priori* Knowledge: Mathematics
 - A. Nineteenth Century
 - B. Twentieth Century
 - C. Current Views

Reason as a Source of Knowledge: Innate ideas. The linguistic theory of Noam Chomsky rekindled interest in whether humans have some kind of innate knowledge which could be called *a priori*. Historical links to Descartes were suggested by Chomsky himself.

Chomsky, N. "Cartesian Linguistics: Acquisition and Use of Language." In Stich, 89-106.

Harman, G. "Psychological Aspects of the Theory of Syntax." In Stich, 165-80.

Hart, W. D. "Innate Ideas and *A Priori* Knowledge." In Stich, 107-110.

Mackie, J. L. "The Possibility of Innate Knowledge." *Proceedings of the Aristotelian Society* 70 (1969-70), 181-96.

Nagel, T. "Linguistics and Epistemology." In Sidney Hook (ed.), *Language and Philosophy*. New York: New York University Press, 1979.

Stich, S. (ed.) *Innate Ideas*. Berkeley: University of California, 1975. Hereafter referred to as 'Stich'.

Stich, S. "Introduction." In Stich, 1-24.

Reason as a Source of Knowledge: Logical rules. Recent work on the psychology of inference has had a bearing on questions of our knowledge of the validity of patterns of deductive inference. The implications of this work for *a priori* knowledge are just beginning to be worked out.

Cherniak, C. "Computational Complexity and the Universal Acceptance of Logic." *Journal of Philosophy* 81 (1984), 739-58.

Goldman, A. I. *Epistemology and Cognition*. Cambridge, Mass.: Harvard University Press, 1986. See especially chapter 13, 278-304.

Johnson-Laird, P. *Mental Models*. Cambridge, Mass.: Harvard University Press, 1983.

Rips, L. "Cognitive Processes in Reasoning." *Psychological Review* 90 (1983), 38-71.

Types of Knowledge. There is not universal agreement regarding the categories of the *a priori*, *a posteriori*, synthetic, analytic, necessary and contingent. Each of the articles listed considers at least some of these distinctions.

Bradley, R. and Swartz, N. *Possible Worlds*. Indianapolis: Hackett, 1979. See especially chapters 3.4-3.6, 142-78.

Kripke, S. "Naming and Necessity." In Davidson and Harman (eds.), *Semantics of Natural Languages*. Dordrecht: Reidel, 1972. 254-355.

McGinn, C. "A Priori and A Posteriori Knowledge." *Proceedings of the Aristotelian Society* 76 (1975-76), 195-208.

Necessary truths: Analytic propositions (propositions of logic). Logical propositions are the likeliest candidates for *a priori* knowledge. There are several theories about the acquisition of logical knowledge, including

conventionalism, intuitionism, and platonism. The most significant challenge to the *a priori* status of logical truths has been the development of alternatives to the standard logic (first-order predicate logic). This raises questions about the possibility of denying such principles as the excluded middle and even non-contradiction.

Dummett, M. "The Philosophical Basis of Intuitionistic Logic." In *Logic Colloquia '73*. Rose, H. and Shepherdson, (eds.). Amsterdam, 1975.

Pap, A. *Semantics and Necessary Truth*. New Haven: Yale, 1958. See especially chapters 5, 6 and 7.

Putnam, H. *Mathematics, Matter, and Method: Philosophical Papers, Vol. 1*. Cambridge: Cambridge University Press, 1975.

Putnam, H. "There Is At Least One *A Priori* Truth." *Erkenntnis* 13 (1978), 153-70.

Quine, W. V. *Philosophy of Logic*. Englewood Cliffs, N.J.: Prentice-Hall, 1970. See especially chapters 4 and 6.

Quine, W. V. "Carnap on Logical Truth." In Schilpp (ed.), *The Philosophy of Rudolf Carnap*. La Salle: Open Court, 1963. See "A Philosopher Looks at Quantum Mechanics" (130-58) and "The Logic of Quantum Mechanics" (174-97).

Necessary truths: Analytic truths (propositions true by virtue of meaning). Quine cast a pall over the prospects for determining identity conditions for meanings. His criticisms of one of the best-known suggestions, Carnap's 'meaning postulates', is indicative of the problems for this species of allegedly analytic truths.

Carnap, R. "Meaning Postulates." In Carnap, *Meaning and Necessity*. (2nd ed.). Chicago: University of Chicago, 1956.

Grice, P. and Strawson, P. "In Defense of a Dogma." *The Philosophical Review* 65 (1956), 2, 141-58.

Pap, A. *Semantics and Necessary Truth*. See especially chapters 8, 9 and 10.

Quine, W. V. "Truth by Convention."

Quine, W. V. "Two Dogmas of Empiricism." In Quine, *From a Logical Point of View*. (2nd ed.). Cambridge, Mass.: Harvard University Press, 1961.

White, Morton. "The Analytic and the Synthetic: An Untenable Dualism." In his *Essays and Reviews in Philosophy and Intellectual History*, New York: Oxford University Press, 1973, 121-37. Also reprinted in *Semantics and the Philosophy of Language*, L. Linsky, (ed.), 1952, and in *Analyticity: Selected Readings*, J. F. Harris, Jr., and R. H. Severens, (eds.), 1970.

Framework principles. The question of the epistemic status of the principles of our 'conceptual framework' is a very general form of issue surrounding *a priori* knowledge. It is the ground on which Kant took his stand in defense of the *a priori*. However, contemporary philosophy has been pessimistic about our ability to isolate such principles and about their epistemic status even if they are found.

Carnap, R. "Empiricism, Semantics and Ontology." In Carnap, *Meaning and Necessity*.

Davidson, D. "On the Very Idea of a Conceptual Scheme." In Davidson, *Inquiries into Truth and Interpretation*. Oxford: Oxford University Press, 1984.

Putnam, H. "The Analytic and the Synthetic." In Feigl, H. and Maxwell, G. (eds.), *Minnesota Studies in the Philosophy of Science*. Minneapolis: University of Minnesota Press, 358-97. Reprinted in Putnam's *Mind, Language, and Reality: Philosophical Papers*, vol. 2, Cambridge: Cambridge University Press, 1975, 33-69.

Quine, W. V. "Two Dogmas of Empiricism". In Quine, *From a Logical Point of View*. (2nd ed.) Cambridge, Mass.: Harvard University Press, 1961.

Quine, W. V. *Word and Object*. Cambridge, Mass.: MIT, 1960.

Synthetic propositions. In the second half of the twentieth century, attention to the issue of synthetic *a priori* propositions has been confined largely to Kant exegesis. Through the late 40's and 50's there has been a controversy over whether certain propositions concerning colors are synthetic *a priori* truths, e.g., can something be red and green all over?

Chisholm, R. *Theory of Knowledge*. (2nd ed.). Englewood Cliffs: Prentice-Hall, 1977. See especially chapter 3, 34-61.

Contingent truths. Until the beginning of the 70's it was assumed almost universally that all *a priori* propositions are necessarily true. This thesis was

challenged by Kripke, who claimed that there is a class of contingent *a priori* propositions, e.g., 'I exist'.

Donnellan, K. "The Contingent *A Priori* and Rigid Designators." *Midwest Studies in Philosophy* 2 (1977), 12-27.

Kripke, S. "Naming and Necessity." In Davidson and Harman (eds.), *Semantics of Natural Languages*. Dordrecht: Reidel, 1972, 254-355.

A Special Case of A Priori Knowledge: Mathematics (19th century). Throughout the 19th century, it seemed clear that mathematical knowledge is *a priori*, and according to Kant, synthetic *a priori*. A lone holdout was J. S. Mill, who believed that mathematical truths are very general empirical propositions. The classical position that all mathematical knowledge is *a priori* and that arithmetical knowledge, in particular, is so, was laid down by Frege.

Frege, G. *Foundations of Arithmetic*. J. L. Austin. (tr.). Oxford: Blackwell, 1950. See especially preface, introduction, chapter 1.

Kant, I. *Prolegomena to any Future Metaphysics*. L. W. Beck. (ed.). Indianapolis: Bobbs-Merrill, 1950. See Part One.

Kant, I. *Critique of Pure Reason*. N. K. Smith. (tr.). London: Macmillan Press, 1933. See the Introduction, Transcendental Aesthetic, Anticipations of Perception.

Mill, J. S. *Systems of Logic*. London: Longmans, 1843. See Book II: Of Reasoning.

Twentieth Century. Often it was suggested that *a priori* mathematical knowledge turned on the formal conventions underlying mathematical systems (von Neumann, Curry). This view, whether it was called formalism or conventionalism, received a serious setback as a result of Gödel's discoveries. It was also criticized on more general philosophical terms (Quine). *A priorism* survived as an epistemology of mathematics by associating with a Platonistic or a constructivist metaphysics (Gödel, Dummett).

Curry, H. "Remarks on the Definition and Nature of Mathematics." In Benacerraf, P. and Putnam, H. (eds.), *Philosophy of Mathematics*. Englewood Cliffs: Prentice-Hall, 1964. Hereafter cited as 'Benacerraf and Putnam'.

Dummett, M. "The Philosophical Basis of Intuitionistic Logic." In Rose, H. and Shepherdson (eds.), *Logic Colloquia* '73 Amsterdam, 1975.

Gödel, K. "What is Cantor's Continuum Problem?" in Benacerraf and Putnam.

von Neumann, J. "Formalism" in Benacerraf and Putnam.

Quine, W. V. "Truth By Convention" in Benacerraf and Putnam.

Quine, W. V. "Two Dogmas of Empiricism" in Benacerraf and Putnam.

Current Views. At present, a number of philosophers are trying to defend the *a priori* character of mathematical knowledge (Steiner, Bealer, Pollock, Rosenkrantz). On the other hand, a growing minority of philosophers is challenging the view that mathematical knowledge is *a priori* (Lakatos, Putnam, Tymoczko, Kitcher).

Bealer, George. *Content and Quality*. Oxford: Clarendon Press, 1982.

Kitcher, P. *The Nature of Mathematical Knowledge*. New York: Oxford, 1984.

Lakatos, I. "A Renaissance of Empiricism in Recent Philosophy of Mathematics." In Tymoczko.

Lakatos, I. "What Does a Proof Prove?" In Tymoczko.

Pollock, J. *Knowledge and Justification*. Princeton: Princeton University Press, 1974. See especially chapter 10.

Putnam, H. "Mathematical Truth." In Tymoczko.

Rosenkrantz, G. "The Nature of Geometry." *American Philosophical Quarterly* 18, 2 (1981), 101-110.

Steiner, M. *Mathematical Knowledge*. Ithaca, N.Y.: Cornell University Press, 1975.

Tymoczko, T. *New Directions in the Philosophy of Mathematics*. Boston: Birkhauser, 1986. Hereafter cited as 'Tymoczko'.

Tymoczko, T. "The 4-Color Problem and its Philosophical Significance." In Tymoczko.

Cross References

For a discussion of some of the classical positions in the controversy over *a priori* knowledge, see also "A Priori/A Posteriori Knowledge" in the "Historical Sources" section (pp. 49-51).

For an example of a course that considers whether recent results in linguistics support some version of *a priori* knowledge, see also "Language and Knowledge" in the "Bridge Courses" section (pp. 123-25).

11. Naturalistic Epistemology

In "Epistemology Naturalized" (1968), Quine said, "The old epistemology aspired to contain, in a sense, natural science; it would construct it somehow from sense data. Epistemology in its new setting, conversely, is contained in natural science, as a chapter of psychology." A growing number of philosophers and other theorists of knowledge have turned away from the positivistic conception of epistemology as rational reconstruction and justification of our knowledge, and have turned to psychology, cognitive science, evolutionary theory, history of science and other areas as sources for answering the questions about the nature and acquisition of knowledge.

Naturalistic epistemology rejects a purely *a priori* or "arm-chair" view of the field, seeing it instead as a branch of empirical science, or at least interdependent with the sciences. In a slightly different vein, naturalism can be understood as a philosophy that focuses on facts as opposed to norms or values. This can lead to an opposition between naturalistic and normative epistemology. For purposes of this unit, however, even an evaluative brand of epistemology is counted as naturalistic if it enlists the sciences, e.g., the cognitive sciences, in the enterprise (as in Alvin Goldman's "epistemics"). Epistemology need not be replaced by the sciences, but may draw on them to construct epistemic rules or make epistemic judgments.

Cross References

For additional readings on the relationship between naturalized epistemology and the philosophy of science, see the sample course "Epistemology and the Philosophy of Science" in the "Bridge Courses" section (pp. 92-101).

For examples of how epistemologists are using scientific data in their work, see also "Rationality" in this section (pp. 26-28), and

the sample courses, "Epistemology and Psychology" in the "Bridge Courses" section (pp. 79-92).

Readings

A. *Conceptions of Naturalistic Epistemology*

Kornblith, H. "What Is Naturalistic Epistemology?" In Kornblith, 1986, 1-13.

Quine, W. V. "Epistemology Naturalized." In Quine's *Ontological Relativity*, Columbia University Press, 1969, 69-89. Reprinted in Kornblith, H. (ed.), *Naturalizing Epistemology*. Bradford Books, MIT Press., 15-29. Hereafter cited as 'Kornblith'. Also in Moser and vander Nat, A. (eds.), *Human Knowledge: Classical and Contemporary Approaches*, New York: Oxford University Press, 1987. Hereafter cited as 'Moser and vander Nat'.

Quine, W. V. "The Nature of Natural Knowledge." In Guttenplan, S. (ed.), *Mind and Language*, Oxford, 1975.

Sosa, E. "Nature Mirrored, Epistemology Naturalized." *Synthese* 55 (1983), 49-72.

Stroud, B. "The Significance of Naturalistic Epistemology." In Kornblith, 1981, 71-89. Reprinted in Moser and vander Nat.

B. *Evolutionary Epistemology*

Campbell, D. "Evolutionary Epistemology." In Schilpp, P. (ed.), *The Philosophy of Karl Popper*. La Salle: Open Court, 1974.

Quine, W. V. "Natural Kinds." In *Ontological Relativity*, *op. cit.* Reprinted in Kornblith, 1969, 31-49.

Sober, E. "The Evolution of Rationality." *Synthese* 46 (1981), 95-120.

C. *Epistemology and Cognitive Science*

Dretske, F. "Précis of *Knowledge and the Flow of Information*." In Kornblith, 1983, 169-88.

Harman, G. "Positive Versus Negative Undermining in Belief Revision." In Kornblith, 1984, 231-48.

Harman, G. *Change in View*. Cambridge, Mass.: MIT Press, 1986.

Goldman, A. I. "Epistemics: The Regulative Theory of Cognition." In Kornblith, 1978, 217-30, and in Moser and vander Nat.

Goldman, A. I. *Epistemology and Cognition*. Harvard, 1986. See especially the introduction, and chapters 5, 6, 9-17.

D. *Epistemology and the History of Science*

Boyd, R. "Scientific Realism and Naturalistic Epistemology." *Philosophy of Science*, 1980.

Giere, R. "Naturalistic Philosophy of Science." *Philosophy of Science*, 1985.

12. Realism

The question of realism arises in regard to both the analysis and the scope of knowledge. An almost invariant component of the analysis of "*S* knows that *p*" is that *S*'s belief that *p* be true; a common component is that the belief be justified. This raises the question of the nature of truth and of its relation to justification. A realist notion of truth holds it to be independent from justification, and not relative to the beliefs, theories, or practices of believers or of their extended communities. An anti-realist denies that such a notion can be used.

In regard to the scope of knowledge, controversy often centers on presumed knowledge of unobservable entities and processes to which scientific theories appear to refer. Are the truth conditions for such theoretical judgments independent from their justification conditions? Do such entities and processes exist, and can we refer to them? Are our theories about them likely to be true in the realist, correspondence sense?

In the suggested readings, Dummett defines the semantic notion of realism and questions its use. Devitt opposes this notion. The early Putnam, Boyd, and Salmon present the case for scientific realism, while the later Putnam, van Fraassen, and Laudan argue against interpreting theories realistically.

Cross Reference

For a brief discussion of the earliest, concerted argument for realism, see also "Theory of Knowledge in Ancient Philosophy" in the "Historical Sources" section (pp. 35-39).

Readings

Boyd, R. "The Current Status of Scientific Realism." In Leplin, (ed.), *Scientific Realism*. Berkeley: University of California Press, 1984. Hereafter cited as 'Leplin'.

Devitt, M. *Realism and Truth*. Princeton: Princeton University Press, 1984. See especially Part II.

Dummett, M. *Truth and Other Enigmas*. Cambridge, Mass.: Harvard University Press, 1978. See especially the introduction and "Realism."

Goldman, A. I. *Epistemology and Cognition*. Cambridge, Mass.: Cambridge University Press, 1986. See especially chapter 7.

Laudan, L. "A Confutation of Convergent Realism." In Leplin.

Putnam, H. *Meaning and the Moral Sciences*. London: Routledge & Kegan Paul, 1978. See Lecture 2.

Putnam, H. "Models and Reality." In his *Realism and Reason*. Cambridge: Cambridge University Press, 1983.

Salmon, W. *Scientific Explanation and the Causal Structure of the World*. Princeton: Princeton University Press, 1984. See especially chapter 8.

Sklar, L. "Saving the Noumena." In *Philosophy and Spacetime Physics*. Berkeley: University of California Press, 1986.

Van Fraassen, B. *The Scientific Image*. Oxford: Oxford University Press, 1980. See especially chapter 2.

13. Rationality

The main areas of inquiry in this module concern recent experimental findings about how people reason and the philosophical implications of these findings. The results suggest that people often do not reason in ways that conform to the norms associated with logic and probability theory. Kahneman and Tversky have written a central paper stating relevant empirical findings. A large body of related literature is summarized in Nisbett and Ross.

Philosophers have responded to the experimental results in diverse ways. Cohen claims that no empirical findings can show that people are systematically irrational. Such claims that the findings do reveal widespread irrationality. (For a critical discussion of Stich, see Feldman). Other philosophers have defended a more moderate position (Cherniak, Elster, Goldman). Some philosophers have argued on *a priori* grounds that if something has beliefs at all, then it must be rational (Davidson, Dennett). For a related view, see Harman. Another theme emerging from some of these papers is that people must be rational because they are the product of natural selection (Dennett).

Cross References

For an example of how some of these issues can be incorporated into an introductory course on epistemology, see the sample course "Knowledge, Rationality and Science" in the "Epistemology: The First Course" section (pp. 58-65).

For recent work on normative theory, see the sample course, "Probability and Induction" in the "Bridge Courses" section (pp. 101-23).

Readings

Cherniak, C. "Minimal Rationality." *Mind* 90 (1981), 161-83.

Cohen, L. J. "Can Human Irrationality Be Experimentally Demonstrated?" *Behavioral and Brain Sciences* 4 (1981), 317-331. Commentary and response, 331-59.

Davidson, D. "Radical Interpretation." In *Inquiries into Truth and Interpretation*. Oxford: Oxford University Press, 1984.

Dennett, D. "Intentional Systems in Cognitive Ethology: The Panglossian Paradigm' Defended." *Behavioral and Brain Sciences* 6, 343-55. Commentary and response, 355-88.

Elster, J. *Ulysses and the Sirens*. Cambridge: Cambridge University Press, 1980.

Feldman, R. "Rationality, Reliability, and Natural Selection." *Philosophy of Science*, forthcoming.

Goldman, A. I. *Epistemology and Cognition*. Cambridge, Mass.: Harvard University Press, 1986. See especially chapters 14-16.

Harman, G. *Change in View*. Cambridge, Mass.: MIT Press, 1986.

Kahneman, D. and Tversky, A. "Judgment Under Uncertainty: Heuristics and Biases." *Science* 185, 1124-1131. Reprinted in D. Kahneman, P. Slovic, and A. Tversky (eds.), *Judgment Under Uncertainty: Heuristics and Biases*, Cambridge: Cambridge University Press, 1982, 3-20.

Nisbett, R. and Ross, L. *Human Inference: Strategies and Shortcomings of Social Judgment*. Englewood Cliffs, N. J. Prentice-Hall, 1980.

Stich, S. "Could Man Be an Irrational Animal?" *Synthese* 64 (1984), 115-35.

14. Epistemic Logic

Instruction in epistemic logic requires that students have a reasonable familiarity with symbolic logic and its semantics. It is possible to cover much of the field with only propositional logic, but some areas require knowledge of predicate logic.

Division of the field:

1. Epistemic Propositional Logic
 - A. Epistemic Principles
 - B. Semantics
2. Epistemic Predicate Logic
 - A. Semantics and Principles
 - B. 'Knows' as a Predicate
 - i. Principles
 - ii. Paradoxes

Epistemic Propositional Logic: Epistemic principles. This is the study of the formal relations holding between sentences with epistemic terms. The terms may be restricted to 'knows' and its cognates or extended to cover related notions such as 'believes', 'is justified', 'is true', etc. Some sample principles are: if *S* knows (believes) that *p*, then *S* knows that *S* knows (believes that *S* believes) that *p* (*KK* or *BB* principle). If *S* knows that *p*, then *S* believes that *S* knows that *p*. If *S* knows that *p*, then *S* knows all *p*'s logical consequences [logical omniscience]. Such principles can be formalized, and choice of appropriate principles is a rich topic of discussion.

Hilpinen, R. "Knowing that One Knows and the Classical Definition of Knowledge," *Synthese* 21 (1970), 109-32.

Hintikka, J. "'Knowing That One Knows' Reviewed." *Synthese* 21 (1970), 141-62.

Hintikka, J. "Knowledge, Belief, and Logical Consequence." *Ajatus* 32 (1970), 32-47.

Hughes, G. E., and Cresswell, M. J. *An Introduction to Modal Logic*. London: Methuen, 1968.

Lemmon, E. J. "If I Know, Do I Know That I Know?" In Avrum Stroll (ed.), *Epistemology: New Essays in the Theory of Knowledge*. New York: Harper and Row, 1967, 54-82.

Lenzen, W. "Recent Work in Epistemic Logic." *Acta Philosophica Fennica* 30, 1-219, Sections 1-4.

Levi, I. *The Enterprise of Knowledge*. Cambridge, Mass.: MIT Press, 1980. Chapters 1-3.

McLane, E. "Is Epistemic Logic Possible?" *Notre Dame Journal of Formal Logic* 20 (1979), 559-74.

Rescher, N. "On Alternatives in Epistemic Logic." In Rescher, *Studies in Modality*. Oxford: *American Philosophical Quarterly Monographs*, 1974.

Schlesinger, G. *The Range of Epistemic Logic*. Aberdeen: Aberdeen University Press, 1985.

Epistemic Propositional Logic: Semantics. Kripke-style "possible worlds" semantics for modal logic can be straightforwardly applied to sentences containing 'knows' and 'believes'. The epistemic or doxastic terms are treated as non-truth-functional one-place operators on sentences. It can be easily shown how to determine the truth value of such sentences for a given interpretation. Discussion might center around the choice of the best semantics (which parallels the choice of epistemic principles). The question of the philosophical interpretation of possible worlds is also an interesting topic.

Hintikka, J. *Knowledge and Belief: An Introduction to the Logic of the Two Notions*. Ithaca: Cornell University Press, 1962. See especially chapters 1-5.

Epistemic Predicate Logic: Semantics and Principles. The discussions in (1) can be extended to principles involving quantifiers. A particularly important problem is how to treat the interaction of quantifiers and epistemic operators.

Quine's treatment of propositional attitudes and responses to Quine are particularly important here.

Hintikka, J. *Knowledge and Belief*, *Ibid.* See especially chapter 6.

Hintikka, J. "Quine on Quantifying in: A Dialogue." In Hintikka, *The Intentions of Intentionality and Other New Models for Modalities*. Dordrecht: Reidel, 1969, 87-111.

Lenzen, W. "Recent Work in Epistemic Logic", *op. cit.*, section 5.

Quine, W. V. "Quantifiers and Propositional Attitudes." In Quine, *The Ways of Paradox*. New York: Random House, 1962.

'Knows' as a Predicate. Epistemic statements may be formalized in predicate logic with 'knows' represented as a relation between a person, a time and a sentence. Other terms ('believes', etc.) can be given the same kind of treatment.

Principles. Some epistemic principles, particularly those of Chisholm, have been formulated in this way.

Chisholm, R. and Keim, R. "A System of Epistemic Logic." *Ratio* 15 (1972), 99-115.

Eberle, R. "A Logic of Believing, Knowing and Inferring." *Synthese* 26 (1974), 356-82.

Montague, R. "Syntactical Treatments of Modality, with Corollaries on Reflection Principles and Finite Axiomatizability." In *Formal Philosophy, Selected Papers of Richard Montague*, New Haven: Yale, 1974, 286-302.

Paradoxes. The combination of various epistemic principles in epistemic predicate logic leads to paradoxes. These are interesting in themselves, and they also shed interesting light on the principles.

Anderson, C. A. "The Paradox of the Knower." *Journal of Philosophy* 80 (1983), 338-55.

Montague, R. and Kaplan, D. "A Paradox Regained." In *Formal Philosophy, op. cit.*

Thomason, R. "A Note on the Syntactical Treatment of Modality." *Synthese* 44 (1980), 391-95.

Tymoczko, T. "An Unsolved Puzzle about Knowledge." *The Philosophical Quarterly* 34 (1984), 437-58.

SAMPLE COURSES

Theory of Knowledge: General Course

CONTRIBUTOR: Alvin Goldman.

Texts

Moser, P. *Empirical Knowledge*. Hereafter cited as 'M'.

Pappas, G. and Swain, M. (eds.). *Essays on Knowledge and Justification*. Hereafter cited as 'P&S'.

Newton-Smith, W. H. *The Rationality of Science*.

Topics and Readings

Part I: Skepticism

Pappas: "Some Forms of Epistemological Skepticism" (P&S)

Lehrer: "Why Not Skepticism?" (P&S)

Klein: selections from *Certainty: A Refutation of Skepticism*

Unger: "A Defense of Skepticism" (P&S)

Part II: Knowledge

Gettier: "Is Justified True Belief Knowledge?" (M)

Lehrer and Paxson, Jr.: "Knowledge: Undefeated Justified True Belief" (P&S)

Goldman: "A Causal Theory of Knowing" (P&S)

Harman: selection from *Thought* (P&S, or M)

Dretske: "Conclusive Reasons" (P&S)

Goldman: "Discrimination and Perceptual Knowledge" (P&S)

* Nozick: selections from *Philosophical Explanations* (chapter 3, Parts I and II).

* optional

Part III: Justification

A. Foundationalism

Chisholm: "The Myth of the Given" (M)

Alston: "Two Types of Foundationalism" (M)

BonJour: "Can Empirical Knowledge Have a Foundation?" (M)

Sosa: "The Raft and the Pyramid" (M)

B. Coherentism

Quine: "Two Dogmas of Empiricism" (section 6)

Lehrer: "Systematic Justification" (P&S)

BonJour: "The Coherence Theory of Empirical Knowledge" (M)

C. Reliabilism

Goldman: "What Is Justified Belief?" (M)

BonJour: "Externalist Theories of Empirical Knowledge" (M)

Pollock: "Reliability and Justified Belief" (M)

D. General

Alston: "Concepts of Epistemic Justification" (M)

Part IV: Probability and Induction

Skyrms: selections from *Choice and Chance*

Goodman: "The New Riddle of Induction", in *Fact, Fiction, and Forecast*

Part V: Naturalism and Relativism

Quine: "Epistemology Naturalized" (M)

Quine: "Natural Kinds," in *Ontological Relativity*

Rorty: selections from *Philosophy and the Mirror of Nature*

Putnam: "Why Reason Can't Be Naturalized"

Part VI: Scientific Theory, Rationality, and Method

Newton-Smith: *The Rationality of Science* (chapters to be assigned, including chapters on Popper, Lakatos, Kuhn, and Feyerabend).

Contemporary Epistemology

CONTRIBUTOR: Philip Peterson.

Designed for graduate students in philosophy, and for advanced, philosophically experienced undergraduates (e.g., philosophy majors), this course begins with a brief review of traditional examples and theories of human knowledge and a look at typical contemporary skeptical arguments. Then it moves to critical assessments of the views that one knows that *p* only if one's belief that *p* can't be wrong, and if and only if one's belief that *p* is true and adequately justified. Out of these analyses (both pro and con) six theoretical approaches to explicating factual knowledge arise, and will be surveyed—namely, foundationalism, coherentism, reliabilism, explanation theory, information theory, and naturalized epistemology. The course concludes with attention to current research on four problems of human knowledge—namely, memory, perception, *a priori* knowledge, and rationality. Among the topics to be considered in the course discussions are fallibilism,

externalism/internalism, realism, knowledge and belief "contents", and cognitive science.

Texts

Pappas, G. and Swain, M. (eds.). *Essays on Knowledge and Justification*. Cornell University Press, 1978. Hereafter cited as 'P&S'.

Phillips-Griffiths, A. (ed.). *Knowledge and Belief*. Oxford University Press, 1967. Hereafter cited as 'P-G'.

Goldman, A. I. *Epistemology and Cognition*. Harvard University Press, 1986. Hereafter cited as 'E&C'.

Topics and Readings

Part I: Is There Knowledge?

Week 1: Is there knowledge?

Readings: Yes: Plato, *Republic* 506d-518d

Aristotle, *Metaphysics* I.1

Descartes, *Meditations* I; selections from III

Hume, *Inquiry* VI, XII

Kant, *Prolegomena* 4,5

Russell, *Human Knowledge*, XI.D

No: A. I. Goldman, *Epistemology and Cognition*, chapter 2

P. Unger, "A Defense of Skepticism" (P&S)

K. Lehrer, "Why Not Skepticism?" (P&S)

Part II: The "Traditional" Concept of Knowledge

Week 2: The "traditional concept of knowledge"

Readings: N. Malcolm, "Knowledge and Belief" (P-G)

E. Gettier, "Is Justified True Belief Knowledge?" (P-G)

A. I. Goldman, "A Causal Theory of Knowing" (P&S)

Lehrer and Paxson, "Knowledge: Undefeated Justified True Belief" (P&S)

Part III: Six Theories of Factual Knowledge

Week 3: Introduction

Readings: D. Armstrong, *Belief, Truth, and Knowledge* (137-8, 150-61)

E. Sosa, "The Raft and the Pyramid" (1980)

Week 4: Foundationalism

Readings: W. Alston, "Two Types of Foundationalism" (1976)

W. Alston, "Has Foundationalism Been Refuted?" (1976)

Week 5: Coherentism

Readings: K. Lehrer, "Systematic Justification" (P&S)

K. Lehrer, "Coherence Theory of Knowledge" (1986)

Week 6: Reliabilism

Readings: A. I. Goldman, "Discrimination and Perceptual Knowledge" (P&S)

A. I. Goldman, E&C, chapters 3-5

W. Alston, "Concepts of Epistemic Justification" (1985)

Week 7: Explanationism and Information Theory

Readings: G. Harman, "Selections from *Thought*" (P&S)

A. I. Goldman, "An Explanatory Analysis of Knowledge" (1984)

F. Dretske, *Knowledge and the Flow of Information* (selections)

Week 8: Naturalized Epistemology

Readings: W. V. Quine, "Epistemology Naturalized"

H. Kornblith, "Beyond Foundationalism and the Coherence Theory"

H. Putnam, "Why Reason Can't Be Naturalized?" (1982)

Part IV: *Four Problems of Knowledge*

Week 9: Memory

Readings: Martin and Deutscher, "Remembering" (1966)

C. Ginet, *Knowledge, Perception, and Memory* (selections)

A. I. Goldman, E&C, chapter 10

Week 10: Perception

Readings: R. Chisholm, *Perceiving* (selections)

Jackson, *Perception* (selections)

Goldman, E&C, chapter 9

Week 11: The *A Priori*

Readings: W. V. Quine, "Two Dogmas of Empiricism"

S. Kripke, *Naming and Necessity* (selections)

N. Chomsky, selections in S. Stich, *Innate Ideas*

P. Kitcher, *Nature of Mathematical Knowledge* (selections)

Week 12: Rationality

Readings: Cohen, "Can Irrationality Be Experimentally Demonstrated?" (1981)

Goldman, E&C, chapter 13

Harman, *Change In View* (selections)

HISTORICAL SOURCES FOR TEACHING EPISTEMOLOGY

CONTRIBUTORS: Carolyn Black, Jim Bogen, Marjorie Clay, Mylan Engel, Keith Lehrer, Johann Marek (University Graz), Matthias Steup, Jim Stone, Tom Tymoczko.

FOUR MODULES

Although the Institute focused exclusively on contemporary epistemology, the participants wished to include some reference to historical sources in this teacher's manual. Two topics are organized around historical periods. The theory of knowledge in ancient philosophy provides a variety of philosophical issues and references to sources that are perhaps not familiar to contemporary epistemologists. Epistemology and the scientific revolution focuses on that fertile period when philosophers and scientists tried to lay the modern foundations for empirical and scientific knowledge. The other two modules are topical and present courses that sketch the development of skepticism on the one hand and the distinction between *a priori* and *a posteriori* knowledge on the other.

We have included readings, often of the classical philosophical works, but we recommend that teachers also consider Moser and vander Nat's anthology, *Human Knowledge: Classical and Contemporary Approaches*, (Oxford University Press, 1987).

Division of this unit:

1. Theory of Knowledge in Ancient Philosophy (p. 35)
2. Skepticism (p. 40)
3. Epistemology and the Scientific Revolution (p. 45)
4. The Distinction Between *A Priori/A Posteriori* Knowledge (p. 49)

1. Theory of Knowledge in Ancient Philosophy

The following materials would be suitable for an intermediate or advanced course (for students who have had some experience reading and discussing philosophy, and who know some logic—preferably, predicate calculus). The suggested readings contain enough to introduce several major themes in epistemology (some of which relate also to philosophy of sci-

ence), and to introduce the student to the ways in which the ancient Greeks went about doing philosophy in one broad area of their major concerns.

Some of the topics sketched below could also be introduced as modules into standard courses on theory of knowledge, partly to provide helpful formulations of contemporary problems, and partly to provide interesting alternatives to present day ways of conceptualizing the issues.

A note on translations: Except where noted below, we recommend:

Plato. *Collected Dialogues*. Hamilton and Cairns (eds.). Princeton, 1971.

Aristotle. *The Complete Works*. Barnes (ed.). Princeton, 1984.

Sextus Empiricus: *Vol. 1*. Bury (tr.). Loeb Classical Library, Harvard, 1961.

1.1 Knowledge and Extreme Relativism. As represented by Plato, the Sophists equated truth with appearance, and argument with persuasion: for any subject, S , and any belief, p , the Sophists held that p is true for S just in case things appear to S as p represents them. But some beliefs may be pragmatically better than others. If p is true for S , and not- p is true for another subject, S' , they are both right, but acting on one of these beliefs will further an agent's interests better than acting on the other. The purpose of education and argument is to persuade people to hold the beliefs that are best for them by making things appear to them in ways that best serve their interests. In *Theaetetus I*, Socrates argues that if truth is relative in this way, no belief can be of any more use than its denial as a guide to action, or as a premise in theoretical reasoning. If this is so, and if some beliefs are in fact better for theoretical and practical purposes than their denials, then there must be beliefs whose truth or falsity depends on facts which are external to, and independent of the way things appear to the subject, or to anyone else. And, Socrates holds, the purpose of reasoning and inquiry is to find out whether a given belief is true by uncovering good reasons for holding or rejecting it--not, as the Sophists held, merely to persuade.

Theaetetus I is the earliest, concerted argument for realism, and for distinguishing between well and ill justified beliefs. It is highly sophisticated, and it differs interestingly from present day explanationist arguments for realism. Rather than arguing that realism is the best explanation for the pragmatic virtues of certain beliefs, Socrates tries to show that the Sophist position is internally incoherent.

Readings

Plato. *Theaetetus I*. (Theory of perception, and realism). With commentary by John McDowell (tr.). Oxford, 1972.

Plato. *Gorgias*. (The Sophist program for anti-realism).

Lee, E. "Hoist on His Own Petard." In Lee, Mourelatos, and Rorty (eds.), *Exegesis and Argument*. Assen, 1974. (On the *Theaetetus*).

If Socrates' argument succeeds, it is natural to ask what are the kinds of things which can be known, what it is to understand them, and how claims about, and putative explanations of them can be assessed for adequacy and accuracy. Except for skepticism, the most characteristic issues in ancient Greek theory of knowledge arise from these questions. The following is an incomplete, but representative sampling.

1.2 Perception and Objects of Perception. Plato's theory of perception is set out in the *Theaetetus* and the *Timaeus*. His view, a harbinger of the distinction between primary and secondary qualities, is that the senses provide nothing more than appearances of things which cannot themselves be perceived, that the objects of perception have no fixed natures, and therefore, that what perception gives us (i.e., appearances) cannot be known. The objects of knowledge are the forms. Perceptibles can be partially understood on the supposition that they are the products of interactions between geometrical particles which constitute the body and the physical things it confronts. To the extent that these particles resemble the geometrical forms, they can be understood as approximations of facts which can be inferred from pure geometry.

Readings

Plato. *Republic V*: 474-483. (Knowledge and belief; forms and perceptible things). The Grube translation (Hackett, 1974) is more readable than Shorey (in Hamilton and Cairns).

Plato. *Republic VI*: 506 to the end. (The divided line).

Plato. *Republic VII*: 523-533. (The cave, mathematics and dialectic).

Plato. *Timaeus*.

The opposing view is Aristotle's: the objects of knowledge are perceptibles, and abstractions from perceptible objects. The best introduction to this view, and to Aristotle's philosophy in general, is John Ackrill, *Aristotle: The Philosopher*, an accessible, reliable, and remarkably readable survey which includes good translations of a number of crucial passages, and a lucid, well-organized commentary.

Aristotle's theory of perception, which develops further the prototypical Greek version of the primary/secondary quality distinction, and which greatly

influenced Locke and the others who originated the versions with which we are most familiar, is to be found in his *De Anima*. He objects to the Platonic idea that only the forms qualify as objects of knowledge are included in the *Physics* and *Metaphysics*.

Readings

Aristotle. *Physics I, II*. (On scientific explanation).

Aristotle. *De Anima*. (On perception).

Aristotle. *Metaphysics*. (Objections to Plato on the objects of knowledge, and scientific knowledge).

Ackrill, J. *Aristotle, the Philosopher*. Oxford, 1981.

1.3 *Scientific Explanation*. Many ancient Greek epistemologists and philosophers of science believed that to understand nature is to be able to explain the features, and motions of things, and what they do to other things by appeal to their hidden constituents. Thus both Plato and Aristotle held that the heat in a thing explains its ability to warm up other things. This kind of explanation, and its early history, are discussed by Moravcsik in "Herakleitean Explanation". An early account of it, along with a discussion of teleological and other sorts of explanation, is developed in the *Phaedo*. Aristotle's account of explanation (the four "causes") is found in the *Physics I, II*. *Parts of Animals* illustrates Aristotle's program for using teleological explanation in biology. *Posterior Analytics* is Aristotle's most systematic treatment of adequacy conditions for scientific knowledge. In effect, what the Greeks mean by 'knowledge' is not justified true belief (with or without a fourth condition). It is understanding constituted by adequate explanation. Hence the relevance of ancient Greek philosophy of explanation to theory of knowledge.

Readings

Plato. *Phaedo*: 97-107. (On scientific explanation).

Plato. *Timaeus*. (Plato's atomism).

Moravcsik, J. "Herakleitean Explanation." In Robb (ed.), *Language and Thought in Early Greek Philosophy*. La Salle, 1983.

Aristotle. *Parts of Animals*. (On teleological explanation). *De Partibus Animalium I* and *De Generatione Animalium I*. With notes by D. M. Balme (tr.). Oxford, 1985.

Aristotle. *Posterior Analytics*. (On scientific knowledge and the problem of the starting point).

1.4 *The Problem of the Starting Point*. Plato's *Meno* version: In order to discover the correct answer to a question, the subject must be able to recognize the truth of the correct answer (if s/he finds it) and the incorrectness of alternative answers. But recognition of correctness would seem to require comparing candidate answers to the correct answer, and if that is what it takes, no one could discover the correct answer unless s/he already had it. How then can a correct answer be discovered? Plato's answer is the doctrine of recollection. A close relative of this problem is posed by Aristotle in the opening sections of *Posterior Analytics*.

Aristotle's version: *Posterior Analytics II* argues that the establishment of the correctness of an explanation requires deductions from first principles which are both true and known with certainty. But if our knowledge of a first principle required us to be able to deduce it, we should have to already know true principles to use as premises in the deduction. And if the knowledge of these latter principles required *their* deduction, it looks as though we are on our way to a vicious regress or circle. Aristotle's solution to this, and his version of the *Meno* problem, is developed in the closing chapters of *Posterior Analytics II*. For commentary, see Robert Turnbull.

Readings

Plato. *Meno*. (On the problem of the starting point).

Aristotle. *Posterior Analytics*. (On scientific knowledge and the problem of the starting point).

Turnbull, R. G. "Physics I: Sense Universals, Principles, Multiplicity, and Motion." In Machamer and Turnbull (eds.), *Motion and Time, Space and Matter*. Ohio State University Press, 1976. (On 'Posterior Analytics').

Cross Reference

For a discussion of contemporary arguments for realism to contrast with the *Theaetetus* account, see "Realism" in the "Contemporary Sources" section (pp. 25-26).

2. Skepticism

This module explores the historical challenge of skepticism and some of the responses to it. It is divided into three sections. The first is devoted to Sextus Empiricus, Montaigne and what might be called the positive defense of skepticism. The second deals with the great expositions of skepticism in modern philosophy found in the writings of Descartes and Hume. The concluding section presents Reid's naturalistic reply to the skepticism in Descartes and Hume.

2.1 *Sextus Empiricus and Michel de Montaigne.* Sextus' writings are a late (2nd century A.D.) compilation of doctrines handed down (and probably altered and distorted) from thinkers such as Pyrrho, Timon, Aenesidemus and members of various academies (Arcesilaus, Carneades), etc. The orientation to the topic of knowledge is far closer to our own than that of any of the materials just discussed. Sextus is largely concerned with the question of whether it is possible to find evidence, argument, or any other sort of justification which provides a better reason to think a belief is objectively true (i.e., accurately represents anything external to and independent of the subject's experience, thought, and other mental processes) than to think it is not. *Outlines of Pyrrhonism* contains a catalogue of methods (*tropoi*) for use in balancing off any considerations which seem to show that a belief is true against equally plausible defeating or undermining considerations. Sextus' view is that although we must conduct our lives on the basis of how things appear to us, it is both harmful and unnecessary to assent to beliefs about how things really are. The methods for defeating or undermining putative justifications are intended to show that assent is both unnecessary and irrational. They include (and are the historical originals of) almost every skeptical argument with which we are familiar. Burnyeat's is the best commentary available in English.

Readings

Sextus Empiricus. *Outlines of Pyrrhonism*. In Hallic, P. (ed.), Etheridge, S. G. (tr.), *Sextus Empiricus: Skepticism, Man and God: Selections from the Major Writings*. Middletown, Conn: Wesleyan University Press, 1964.

Burnyeat, M. "Can the Skeptic Live His Skepticism?" In Burnyeat (ed.), *The Skeptical Tradition*. University of California Press, 1983. This volume includes a number of other useful essays, including an introduction by Burnyeat, and papers by Sedley, Frede, and Striker.

Scholfield, Burnyeat, Barnes (eds.). *Doubt and Dogmatism: Studies in Hellenistic Epistemology*. Oxford, 1980. A number of other valuable papers are collected in this volume.

One aspect of Pyrrhonism that is often overlooked by contemporary epistemologists is its intense practical concern. Far from the destructive, life-threatening paralysis that many people associate with skepticism, the *agoge*, or way of life, that Sextus described was one that stressed tranquillity, stability, quietude, *ataraxia*. Unsettled by the myriad opinions s/he finds on virtually every subject, the skeptic sets out "to philosophize with the object of passing judgment on the sense impressions and ascertaining which of them are true and which false, so as to attain quietude thereby." Because the search produces the recognition that there are arguments on all sides and that they tend to balance each other, s/he suspends judgment. But ironically, that suspension of judgment (*epoche*) produces just the state (*ataraxia*) s/he had sought in the initial inquiry. S/he finds what s/he wanted only after abandoning the search. Or, as Sextus puts it, "the Skeptics were in hopes of gaining quietude by means of a decision regarding the disparity of the objects of sense and of thought, and being unable to effect this they suspended judgment; and they found that quietude, as if by chance, followed upon their suspense, even as a shadow follows its substance" (*Outlines of Pyrrhonism* I, xii).

In contrast, the Dogmatists, with their constant struggle to attain truth, are continually "disturbed". They make conflicting claims about the hidden natures of things, and then feel compelled to engage in endless wrangling over which claim is true. But since the claims are all about non-evident qualities and essences, there is no decisive factual criterion for resolving the dispute. "For all we know," any of the claims might be true. But since we can never say with certainty which--if any--is true, the only appropriate response is to withhold belief from all claims that go beyond what is immediately evident to us.

Readings

Annas, J. and Barnes, J. *The Modes of Skepticism: Ancient Texts and Modern Interpretations*. Cambridge, Mass.: Cambridge University Press, 1985.

Chisholm, R. "Sextus Empiricus and Modern Empiricism." *Philosophy of Science* 8 (1941).

Hallie, P. *The Scar of Montaigne: An Essay in Personal Philosophy*. Middletown, Conn: Wesleyan University Press, 1966. See especially chapter 2, "Doubt and Man."

Michel de Montaigne (1533-1592) uses Pyrrhonism with full recognition of its potential value as a therapy, a means for curing man of his various pretensions and restoring him to his natural common sense. When he writes, "I can easily maintain an opinion, but not choose one" (*Essays* Book II, chapter 17), he is not simply revealing some particular weakness of

his own. Rather, in the classical Pyrrhonic manner, he is exposing a deficiency at the very heart of philosophy, a weakness that affects all choices, all beliefs, all justifications. The problem is not with justifying beliefs, but with the claim that the justifications somehow guarantee the truth of those beliefs. For Montaigne, no set of reasons can be decisive in the sense required to guarantee truth, but far from being a fatal conclusion, this deficiency is seen as an invitation to mental poise, balance, a peaceful existence, the suspension of all discords. If the invitation turns out also to be a denial of the possibility of rational solutions to disputes over the limits of justification or conflicting criteria (in the sense that anything less than guaranteed truth is not acceptable, no matter how reasonable it may seem), so much the worse for philosophy and its preoccupation for truth.

Readings

Hallie, P. *The Scar of Montaigne*. See especially chapter 3 for a detailed account of how Montaigne uses Pyrrhonic techniques in his famous "Apology for Raymond Sebond."

Montaigne, M. *The Complete Essays of Montaigne*. D. Frame (tr.). Stanford: Stanford University Press, 1948.

2.2 Rene Descartes. In the first *Meditation*, Descartes sets forth three skeptical arguments: (i) the argument from sense perception, (ii) the dream argument, and (iii) the evil demon argument. Reconstruction and critical evaluation of these arguments provide exciting and engaging topics for student papers on skepticism. In the second *Meditation*, Descartes argues that there is at least one thing of which he can be certain, namely his own existence. From there, he goes on to provide a putative foundation for human knowledge. Two important issues for contemporary epistemology arise here: (i) epistemic circularity: in order to demonstrate the possibility of knowledge, Descartes appeals to knowledge of God's existence; and (ii) epistemic principles: Descartes introduces "clear and distinct perception" as a criterion for knowledge. A good discussion of these issues is provided by Van Cleve's article, "Foundationalism, Epistemic Principles, and the Cartesian Circle." Van Cleve suggests a solution to the problem of the Cartesian Circle and connects the problem to the contemporary debate between coherentists and foundationalists.

Readings

Descartes. *Meditations*.

Van Cleve, J. "Foundationalism, Epistemic Principles and the Cartesian Circle." *Philosophical Review* 88 (1979), 55-91.

Frankfurt, H. G. *Demons, Dreamers, and Madmen: The Defense of Reason in Descartes' Meditations*. Indianapolis: Bobbs-Merrill, 1970.

Hooker, M. *Descartes: Critical and Interpretative Essays*. Baltimore: Johns Hopkins University Press, 1978.

Kenny, A. *Descartes: A Study of His Philosophy*. New York: Random House, 1968.

Williams, B. *Descartes: the Project of Pure Enquiry*. London: Penguin Books, 1978.

Wilson, M. *Descartes*. London: Routledge & Kegan Paul, 1978.

2.3 David Hume. While Descartes' method of doubt is a method for discovering the foundations of knowledge, Hume's skepticism is designed to undermine ordinary claims to knowledge. According to Hume, knowledge of the external world can be established neither deductively nor inductively. Induction rests on the presupposition that nature is uniform, that the future will resemble the past. But this presupposition cannot be justified. Nor can knowledge of the external world be gained through deduction, for information about physical objects goes beyond what is immediately perceived. Thus matters of fact and existence cannot be objects of knowledge, because the inference which legitimizes the transition from past experience to future occurrence is not rationally defensible.

This apparently negative (skeptical) conclusion represents only half of the project, however. If skepticism had been the aim of the work, as some commentators suggest, then Hume should have stopped at the end of Book I of the *Treatise*: the account he gives of why reason and experience fail to justify the truth of simple matters of fact is quite powerful. But Hume does not want to deny the sureness of our claims that the sun will rise tomorrow, or that bread nourishes. In order to preserve those convictions, he is quite willing to concede that what guarantees them is not an intellectual certainty at all, and hence, not sufficient to justify our claims to *know* these matters of fact. But Hume insists that it is a certainty nonetheless, and he devotes a great deal of space in the *Treatise* and the *Inquiry* to giving an account of the nature and source of that certainty.

Hume discusses skepticism in the *Treatise*, Book I, Part IV, and in the *Inquiry*, section XII. Hume's theory of cause and effect, that is, his attack on the idea of a necessary connection between cause and effect can be found in the *Treatise*, Book I, Part III, Section XIV, and the *Inquiry*, VII, Part II.

Readings

Hume, D. *A Treatise of Human Nature*.

Hume, D. *Inquiry Concerning Human Understanding*.

Stroud, B. *Hume*. London: Routledge & Kegan Paul, 1977.

Chappell, V. (ed.). *Hume*. New York: Doubleday & Company, Inc., 1966.

Bennett, J. *Locke, Berkeley, Hume: Central Themes*.

2.4 *Thomas Reid*. In both the *Inquiry* and the *Essays* Reid sees himself as responding to the Modern skeptical tradition beginning with Descartes and culminating with Hume. Reid contends that skepticism is the inevitable result of these philosophers' commitment to the erroneous theory that the immediate object of thought is always some idea or image in the mind, and consequently, all knowledge of the external world is mediated via these ideas.

Reid lays the groundwork for his positive epistemology by arguing that consistency requires that we regard all our cognitive faculties as *equally* trustworthy (or untrustworthy). Thus, it is illegitimate for the skeptic to use one faculty to attempt to confute another faculty. Since we all do in fact trust our faculties, we all do implicitly regard them as trustworthy. He contends that knowledge has a foundational structure which is ultimately grounded in the first principles of our constitution. These first principles confer justification on the beliefs that they give rise to.

Reid's epistemology turns on the following question: How do we know the first principles are true? His answer to this question is a bit complicated. First of all, first principles do not admit of direct proof because any purported proof would have to proceed in terms of the reasoning faculty which is itself grounded in first principles. Hence, any reasoning intended to prove the truth of the first principles already takes for granted the thing to be proved. Of course, it is also impossible to *prove* that the faculties are fallacious since such a proof would equally depend on the trustworthiness of the reasoning faculty.

The final reason for trusting our faculties and the first principles according to which they work is that the following is a first principle of our nature:

(MP) That the natural faculties, by which we distinguish truth from error, are not fallacious.

This meta-first principle (hence, 'MP') must, like all first principles, be regarded as innocent until proven guilty. Thus in addition to its foundational structure, knowledge for Reid rests on our own natural conviction of our reliability. The skeptic cannot get a foot in the door, since even s/he must assume, if s/he is consistent, the reliability of our faculties in the attempt to prove them unreliable.

Readings

Reid, T. *Inquiry and Essays*. Beanblossom and Lehrer (eds.).

All of the selections taken from Reid's *An Inquiry into the Human Mind on the Principles of Common Sense*.

The following selections from Reid's *Essays on the Intellectual Powers* are most pertinent to his epistemology:

- Essay One, Chapters 1 and 2
- Essay Two, Chapters 5, 14 and 20 (Chapter 20 is especially important)
- Essay Four, Chapter 2
- Essay Six, Chapters 1, 4, 5 and 6

Van Cleve, J. "Foundationalism, Epistemic Principles, and the Cartesian Circle," *Philosophical Review*, 1979.

Vernier, P. "Thomas Reid on the Foundation of Knowledge and His Answer to the Skeptic." In Barker and Beauchamp (eds.), *Thomas Reid: Critical Interpretations*.

Cross Reference

For a discussion of the role skepticism plays in contemporary epistemology, see also "Skepticism" in the "Contemporary Sources" section (pp. 3-4).

3. Epistemology and the Scientific Revolution

The following materials present important and familiar issues and theories in epistemology against the setting of 17th century scientific developments. In fact, the consideration of problems concerning perception, the status of mathematical truth and its application to empirical phenomena, the possibilities of understanding and explaining physical phenomena, and such theories as phenomenism was motivated to an important extent by developments in science, and problems in the philosophy of science, and its methodology like those represented in these readings. Accordingly, considerable insight into the epistemological issues can be gained by a course which covers the material outlined below.

These materials are suitable (depending upon their treatment) for both introductory and advanced courses in philosophy, as well as for interdisciplinary "humanities" courses. They have the advantage of providing a motivation for the study of epistemology which is largely unavailable when the philosophical works of the likes of Descartes, Locke, and Berkeley

are presented (as is customary) in abstraction from their scientific settings. And it is hoped that presentation of reasonably accessible episodes from the history of science in connection with classic readings in the theory of knowledge can encourage humanities students who have shied away from science and the history of science to give them a try.

Readings

Bacon, F. *New Organon*.

Berkeley, G. *Philosophical Writings*.

Burt, E. A. *Metaphysical Foundations of Modern Science*. Hereafter cited as 'Burt'.

Cohen, I. B. *The Birth of a New Physics*. New York: W.W. Norton Co., 1985. Hereafter cited as 'Cohen'.

Descartes, R. *Philosophical Writings*. Cottingham, et. al. (eds.). Cambridge: Cambridge University Press, 1985.

Hall, M. B. *Nature and Nature's Laws*. Hereafter cited as 'Hall'.

Locke, J. *An Essay Concerning Human Understanding*. New York: Dover Publications, 1959.

Newton, I. *Newton's Philosophy of Nature*. H. S. Thayer (ed.). New York: Hafner Publishing Company, 1953. Hereafter cited as 'Newton'.

3.1 Primary and Secondary Qualities: The Scope and Nature of Empirical Evidence. The readings below provide a sample of 17th century scientific arguments for the thesis that colors, and a great deal of other sensory features, are best explained as effects caused in the perceptual systems by external objects (e.g., atoms) which lack the sensory properties (e.g., atoms and Newtonian particles are colorless). Furthermore, although the causes of sensor experience have some properties (e.g., shape and size) which we can perceive, the causes themselves are too small to be perceived. The question this raises is whether, or how, the senses can provide evidence against which accounts of the causes of perception can be checked, and how or whether they can help in the discovery of what actually goes on in the physical world.

A further question, raised by the Hooke selection, is how the role of observational instruments (like the microscope) should be understood. Are they simply aids which increase the power or the range of the senses? If so, how can they do more than add perceptions of secondary qualities which are not themselves either intrinsic to physical objects, nor explanatory of effects in our perceptual systems and in other physical things? Or are they sources of

information of a different kind than what the senses can provide? If so, how can this be squared with the fact that their input must be perceived?

Readings

Burr. chapter 3 (on Galileo).

Descartes. *Meditations I, VI* (on the degree to which the senses can be trusted).

Hall. 230-63 (selections on color from Boyle, Hooke, Newton).

Locke. *Essay II*, ii-ix (on primary, secondary, and tertiary qualities).

3.2 Methodology: the Discovery and Testing of Theories. The readings listed below represent a debate over methodology. Bacon and Newton both hold versions of the idea that scientific theories should be reached by inference from particular "phenomena", "observations" or empirical facts. Descartes argues that explanatory principles should be deduced from geometry, mathematics, and other non-empirical knowledge; empirical information serves to determine their applicability to natural phenomena, rather than to establish their truth. Yet both Newton and Descartes agree that explanations in physics should be essentially mathematical or geometrical. The first question this raises is how their common commitment to mathematical physics can be squared with their disagreement over the role of empirical investigation. The second question (which connects with material in the following sections) is what Newton, Bacon and Descartes considered the input of empirical investigation to be. It is clear that the phenomena from which Newton thought theories should be extracted were not sense data, the ways in which things appear to observers, or other such things. The same holds for Bacon, but Newton's phenomena don't seem to be the same sorts of data as Bacon mentions in his examples of the study of heat. Nor is it clear just what Descartes took "experiences" to be.

Readings

Bacon. *New Organon*: Aphorisms, Book II.

Descartes. *Rules for the Direction of the Mind*.

Descartes. *Principles*: IV, para. 203, 204; III, para. 4, II.

Newton. 3-8, 45, 12-40.

3.3 Historical Examples of Scientific Reasoning. The material in this section is intended to provide examples to be compared against the Baconian, Newtonian, and Cartesian accounts of scientific reasoning. The question is to

what extent any of these accounts seem faithful to the reasoning by which some crucial theories in astronomy and physics were argued for.

Readings

Cohen. 3-185 (background reading).

Hall. 53-96 (selections from Tycho Brahe, Kepler and Galileo on astronomy).

3.4 Historical Examples of Experiments and Observations. The readings in this section focus on experiments, observations, and their results. They should be considered (along with Boyle, Hooke, and Newton on color) in connection with the question of what empirical investigation provides, and the earlier question (topic 3.1) of whether empirical results obtained from the use of instruments differ importantly in kind from the perceptions of the unaided senses.

Readings

Hall. 136-71 (selections from Harvey and Lower).

Hall. 184-215 (selection from Torricelli, Pecquet, Boyle).

Cohen. 185-93 (on Galileo and the telescope).

3.5 Epistemic Status of Principles of Reasoning and A Priori Truths. These readings represent a central dispute between the Empiricists and the Rationalists on the status of mathematical and other non-empirical truths and principles of reasoning which scientists and philosophers of both camps agree to be essential to scientific knowledge.

Readings

Descartes. *Meditations* II-V.

Locke. Book I Book IV: v, vi.

3.6 Phenomenalism and Its Motivation: Newton rejects Descartes' characterization of motion (*Descartes: Principles II*) on the grounds that it doesn't define motion in terms of absolute space or time. But (as he admits) there seems no way to measure either space or time except relatively. Newtonian physical explanations rely upon at least two quantities which don't seem to be accessible to direct empirical observation or measurement—force and mass. Descartes' physics characterizes physical objects as having no essential features beyond extension. But it is unclear both how extension can be empirically measured or observed, and how (even if it could be determined) objects with no

essential features could accomplish what they are required to do in Newtonian and Cartesian theories. Both Descartes and Newton appeal to the influence of God to ground the interactions of physical objects, but God's role in the explanatory scheme appears to conflict with the strategy of explaining physical phenomena by appeal to the doings of Newtonian physical particles or Cartesian corpuscles.

The Berkeley readings present a drastic solution to all such difficulties: a phenomenalist analysis of both science and common sense (or folk science) which dispenses with mind-independent physical things altogether, treats space, time, their properties, as well as physical objects and their properties as reducible to sensations, and replaces the traditional idea of efficient causality with a constant conjunction account which was taken over, developed, and popularized by Hume. In addition, Berkeley's account was supposed to eliminate the difficulties of inferring the intrinsic and explanatory features of physical objects from sensations or perceptions, as these were construed by everyone in the readings from Galileo to Locke. It is arguable that phenomenism (both Berkeley's version, and its descendants, developed by C. I. Lewis and the logical positivists) is best understood as a response to crucial problems in the philosophy of science, such as those illustrated by these readings.

Readings

Berkeley. *Principles, De Motu, Dialogue 1.*

Newton. 41-67, 105-134.

4. The Distinction Between *A Priori* and *A Posteriori* Knowledge

The distinction between *a priori* and *a posteriori* knowledge, alternatively, between the truths of reason and the truths of sense, has been one of the crucial foci of modern philosophy. Even if the distinction has begun to blur in recent times, it is still important to the philosophies of mathematics and of language. Finally, the dispute between rationalism and empiricism helped shape modern science and philosophy. Hence the topic provides a unifying theme for historical reading and also introduces students to current issues. Some secondary texts that might prove useful are:

Wilson, M. *Descartes*. London: Routledge & Kegan Paul, 1982.

Rescher, N. *Leibniz: An Introduction to His Philosophy*. Oxford: Blackwell, 1979.

Stroud, B. *Hume*. London: Routledge & Kegan Paul, 1977.

Allison, H. *Kant's Transcendental Idealism*. New Haven, Conn.: Yale University Press, 1983.

We suggest beginning with a brief consideration of Kant's distinction between *a priori* and *a posteriori* knowledge, since his statement of it is perhaps the clearest conceptually. Students are probably more familiar with *a posteriori* or experiential knowledge, so we turn to Plato for a dramatic statement of the primacy of *a priori* knowledge. The details of Plato's theory of knowledge are interesting and a challenge to naive empiricist sensibilities. Moreover, the mysterious quasi-religious quality of Plato's *a priori* knowledge provides an interesting subtext for later technical debates.

Readings

Kant. Introduction to *The Critique of Pure Reason*.

Plato. *Meno, Republic* (selections).

Having thus set the stage, the study begins in earnest with the 17th century debate between rationalism and empiricism. Rationalists, like Descartes, Leibniz and Spinoza, stressed the primacy of reason as a method for understanding the world and so moved to a rationalistic conception of science as proceeding by *a priori* deduction and mathematical demonstration. A special virtue of rationalist doctrine was its ability to give an account of mathematics that seemed to accord with our intuitions. Since the development of science went hand-in-hand with the development of sophisticated mathematics, the rationalist account of mathematics was a strong point in their favor.

Readings

Descartes. *Meditations*, especially II, III.

Leibniz. *New Essays*, Book 3, chapter iii; Book 4; read the preface for a critique of Locke.

For further background, see the Leibniz-Arnauld correspondence.

In contrast to the rationalists, the empiricists such as Locke, Berkeley and Hume maintained that all knowledge is acquired in experience and can be substantiated there. This kind of hard-headed philosophy seemed to work best for immediate perception and to square well with the stress on experimental methods in science. It was weaker, of course, in accounting for abstract ideas and general principles, especially those of mathematics.

Readings

Locke. *Essay Concerning Human Understanding*, Books 1, 4.
 Berkeley. *Principles of Human Knowledge*, Introduction.

Hume. *A Treatise Concerning Human Nature*, Book 1, Parts 1-3.

Kant gave the best systematic development of *a priori* knowledge and the most plausible treatment, to that time, of the structures of mind needed to support such knowledge. It is important to stress his doctrine of synthetic *a priori* knowledge as a way of admitting experience without giving into the extremes of pure experience.

Kant. *Prolegomena to Any Future Metaphysics*, especially First and Second Part.

For further background, see *The Critique of Pure Reason*, Transcendental Doctrine of Elements through the First Division.

Another synthesis of rationalism and empiricism, and an interesting contrast to Kant, was that of early Russell and the Vienna Circle. Using the logical tools of Frege and Russell to forge the mathematical structure rationalists had always demanded, this group then applied these structures to the empiricists' immediate experience in an effort to rationally reconstruct science. *A priori* knowledge was demystified, reduced through stages to pure logical knowledge and, eventually, to knowledge founded on convention. From synthetic *a priori*, philosophy returned to the analytic *a priori*.

Readings

Russell. *Our Knowledge of the External World*, II, III, IV.

Ayer. *Language, Truth and Logic*.

Cross References

For a discussion of the role of *a priori* knowledge in current discussions of epistemology, see also "A Priori Knowledge" in the "Contemporary Sources" section (pp. 16-23).

For an example of a course that considers whether recent results in linguistics support some version of *a priori* knowledge, see also "Language and Knowledge" in the "Bridge Courses" section (pp. 123-25).

SAMPLE COURSES

Theory of Knowledge: General Course

CONTRIBUTOR: Keith Lehrer.

This course makes use of historical sources to consider in a sustained and systematic way three perspectives in epistemology:

1. Dogmatic Epistemology
2. Critical Epistemology
3. Scientific Epistemology.

I try to get students to appreciate those problems that are uniquely epistemological as opposed to metaphysical and psychological problems. If, by the end of the course, I feel that I have accomplished this central purpose, I then attempt to connect epistemological issues with issues in philosophy of science and philosophy of mind.

1. *Dogmatic Epistemology.* I argue that the traditional approach to epistemology through Plato was to place metaphysics first and then append an epistemology. The methodology was to ask what was the basic reality and then add an epistemology to explain how we know that reality. I take the ancient problem of negation as illustrative.

The *Theaetetus* is useful for getting the standard analysis of knowledge as true opinion plus an account up for consideration. I argue that the reason that Plato does not accept this account is his acceptance of the forms as the ultimate reality that leads him to account for knowledge as an intuitive awareness of the forms.

Readings

Plato. *Theaetetus* (selections from the Presocratics)

2. *Critical Epistemology.* I argue that there is a revolution in epistemology introduced by Descartes in that he placed the question of what we can know prior to questions of what is ultimately real. I attribute to him the immediacy thesis, which says that what we know immediately is confined to ideas in our own minds. I take Hume as the developer of the consequences of this theory. I take Reid as the refuter arguing that we have immediate knowledge of the external world.

Reid pointed out that the diversity of appearances of an object, rather than showing that we do not perceive the object, is a necessary condition of perceiving it. He also noted that the skeptics assume that our beliefs

resulting from consciousness and reason are justified and that they have no more justification for assuming those beliefs to be justified than the beliefs resulting from perception. All the faculties are fallible, and some perceptual beliefs are as certain as any beliefs. For example, the belief that I see a table and am not asleep and dreaming is immediately justified. I may not be able to say how I know that I am awake and perceiving a table, but that is because such knowledge is immediate.

Readings

Descartes. *Meditations*.

Hume. *Inquiry Into the Human Understanding*. Indianapolis: Bobbs-Merrill. The sections on perception and skepticism.

Reid. *Inquiry and Essays*. Indianapolis: Hackett. Selected sections on perception.

3. *Scientific Epistemology*. I argue that there is a third approach to epistemology where theories about what we can know and theories about what is real are given equal status, that is, neither is assumed to be prior to the other. Consequently, a theory of knowledge should explain how we know those things which we most clearly do know and at the same time provide a critical standard of evaluation for knowledge claims.

The project is to construct a coherent scientific account of what is known and how it is known. I take Russell as an example of someone developing such an epistemology in that he offers an explanation of how we are justified in believing those things Reid affirms we are immediately justified in believing. I consider foundationalism and argue that this theory in postulating that some beliefs are justified without explanation has all the advantages of theft over honest toil. I note, in favor of such theories, that they are correct in assuming that we have some immediate, that is, noninferential knowledge.

I next consider reliabilist theories of knowledge. These theories offer an explanation of why the beliefs postulated as justified by the foundationalist are justified, namely, that they are reliable guides to truth. I argue, however, that receiving information by a reliable process is compatible with a failure to know that the information is correct. Such accounts are inadequate as accounts of scientific knowledge which depend on various methods to distinguish correct from erroneous hypotheses, theories and experimental information.

I conclude that a coherence theory of knowledge and justification allows us to explain the relation between truth and justification. A coherent account, and, therefore, a justified one contains the assumption that we are reliable in evaluating our beliefs, methods, and, ultimately, our own reliability. I end with discussion of arguments concerning regresses and circularity.

Readings

Russell. *Problems of Philosophy*.

Pappas and Swain (eds.). *Essays on Knowledge and Justification*.

Pappas (ed.). *Justification and Knowledge Philosophical Topics*.
(vol. 14, no. 1)

[Lehrer, *Knowledge*].

Knowledge vs. Skepticism in Modern Philosophy

CONTRIBUTOR: Mylan Engel.

This course gives students an opportunity to work intensively with a set of primary texts, with the goal of developing their own interpretations of what the philosophers meant. Other objectives include: 1) acquiring a firm understanding of the roots of important issues in contemporary epistemology; 2) exploring the historical connections between epistemology and psychology; 3) examining how various metaphysical assumptions, such as the theory of ideas, can lead to specific kinds of epistemological conclusions; and 4) considering the Rationalist/Empiricist debate, and how different epistemologies result from different starting points.

Texts

Descartes. *Meditations*.

Descartes. *Discourse on Method*.

Hume. *Inquiry Into the Human Understanding*.

Hume. *Treatise* (selections).

Reid. *Inquiry and Essays*. Beanblossom and Lehrer, (eds.).

Van Cleve, J. "Foundationalism, Epistemic Principles, and the Cartesian Circle." *Philosophical Review* Jan. (1979).

Vernier, P. "Thomas Reid on the Foundation on Knowledge and His Answer to the Skeptics." In Barker and Beauchamp (eds.), *Thomas Reid: Critical Interpretations*.

Section 1: Descartes

- Descartes' Method of Doubt
- Descartes' Dream Argument to set the stage for skeptical worries
- Descartes' Foundationalism
- Descartes' Theory of Ideas
- Descartes' reliance on reason as opposed to the senses
- Descartes' way out of skepticism.

Section 2: Hume

- Hume's commitment to the theory of ideas
- Hume's use of the theory of ideas to support skepticism with respect to the external world, the self, and induction;
- Hume's role in driving Descartes' theory of ideas to its logical conclusion: skepticism.

Section 3: Reid

- Reid's refutation of the theory of ideas
- Reid's version of foundationalism
- Reid's notion of "evidence" as a ground of belief
- Reid's dependence on "First Principles"
- Reid's Facultative approach (all our cognitive faculties are equally trustworthy, so the Rationalists' preference for reason is inconsistent)
- Reid's meta-First Principle (the faculties by which we distinguish truth from error are not fallacious)
- How Reid avoids the skeptical conclusion.

THE FIRST COURSE

There is something fundamentally paradoxical about teaching theory of knowledge. When students ask, "But what are we supposed to *know* for the next test?", what does a teacher of epistemology say? And if that question comes from a person who is not yet acquainted with the curious self-reflexive nature of philosophy--our tendency to ask questions about the very way we ask questions--how can we expect to operate simultaneously on all of the levels it demands? In short, is it possible to teach theory of knowledge and introduce students to philosophy both at the same time, without hopelessly confusing them or frustrating ourselves?

In this section, you will find courses that illustrate four different ways to answer that question. The first course (pp. 58-65), "Knowledge, Rationality and Science," offers a broad, thematic overview of epistemology, suitable as a first course in philosophy, or as an honors general education course. It assumes no philosophical background, and suggests some cross-disciplinary possibilities with anthropology, psychology, and history of science. Students should come away from this course with an understanding of the assumptions that shape our Western view of intellectual inquiry, how it has developed, and how it should be judged.

The second course (pp. 65-73), "Introduction to Philosophy (Emphasizing Epistemology)," shows how a standard introductory philosophy course can be adapted to focus on central historical texts in epistemology. Students taking this course will receive a solid grounding in the tools of philosophy (logic, argument analysis, etc.), as well as a thorough acquaintance with some of its classic figures (Descartes, Berkeley, Russell, etc.).

The third course (pp. 73-75), "Introduction to Epistemology: A Topical Approach," represents one way to introduce students to recent issues in epistemology. Teachers interested in adapting this course for their own use may find additional material in the relevant modules from the Contemporary Sources section--for example, modules 1, 3 and 6. The advantage of this approach is that students receive a focused survey of the problems 20th century epistemologists have encountered as they pursue an analysis of knowledge. For that reason, we believe it offers a good introduction to epistemology.

Finally, we have included a course (pp. 75-76), "Skepticism," which illustrates how a single topic can be developed to introduce students both to various important analytic tools (e.g., paradigm case arguments, ordinary language analysis), and also to central epistemological concerns (e.g., concepts of knowledge, doubt, certainty and belief). Ranging from Descartes to Wittgenstein, this course combines an interesting topic with a wide

variety of approaches to that topic; it should serve well both as an introduction to epistemology and also as a solid basic course in philosophy.

SAMPLE COURSES

Knowledge, Rationality and Science

CONTRIBUTORS: Drew Christie, Marjorie Clay, William Morris, Andy Naylor, Tom Tymoczko.

This course looks at the Western epistemological tradition from a broad, thematic perspective. It emphasizes the close connections between the conceptions of knowledge, scientific method and rationality which dominate our picture of how inquiry should proceed and how it should be evaluated. The course first develops a historical account of this picture of inquiry, and examines the most prominent arguments supporting it. Then equal attention is paid to recent challenges—some within the tradition, some without—to this standard conception.

The course begins with a detailed study of Descartes. We stress the skeptical, methodological and scientific concerns which shape his project, and, with it, the course of Western epistemology. We also discuss the connections between Descartes' emphasis on the individual character of inquiry and the rise of individualism in political and ethical theory.

Peirce's critique of Cartesian doubt provides a useful vehicle for questioning whether Descartes' project is necessary for the acquisition of knowledge, and whether it is possible actually to apply his method. Peirce also raises probing questions about the individualistic character of Cartesian inquiry, arguing that Descartes ignores the collective character of inquiry in the scientific community.

The pragmatic spirit of Peirce's reaction to Descartes leads naturally to the Clifford/James debate, which introduces questions of rational belief, choice of belief and responsibility for belief choice.

Next we consider the emergence of induction. We look at Hume's skeptical questions about causation and inductive reasoning which emerged with it, and Mill's attempts to codify inductive methods.

These questions about causation and induction raise further issues about the nature of inductive, causal and probabilistic explanation. Questions raised by the Clifford/James debate surface in a new guise: how are we rationally to choose what to believe if we must choose among hypotheses which are merely more or less likely?

We trace the development of canons of inductive inference and causal explanation, and introduce the covering-law model of scientific explanation. That model is considered in detail, along with the picture of rational thinking as scientific thinking which historically accompanies it. The culmination of this picture is Logical Positivism, which we consider briefly, along with its

characteristic scientific outlook. This is a natural place to consider questions of demarcation: the disjunction between science and non-science. Philip Kitcher's *Abusing Nature*, a recent study of creationism and science, provides a particularly effective way to introduce discussion of these issues.

Having developed the traditional picture of the paradigm knower as a rational, scientific inquirer, we turn to some prominent critiques of this tradition. We look first at Richard Rorty's enormously influential *Philosophy and the Mirror of Nature*, which depicts the entire Western epistemological tradition as based upon a mistake, a myth foisted off on us by Descartes. Rorty also thinks that there is a "hidden agenda" in this program: the defense, by secular intellectual individualists, of the values of science, democracy and art.

It is helpful, in evaluating Rorty's position, to consider some reactions to his charges. We look at several recent articles which argue, from various perspectives, that the problems of epistemology arose from concerns more fundamental to the human condition than Rorty grants.

Another influential critique of the tradition questions the standard account of scientific rationality. The challenge, interestingly, comes from historians of science, who argue that examination of actual scientific discoveries and explanations reveal that science proceeds in a manner quite different from that legislated by the traditional picture. Thomas Kuhn's *The Structure of Scientific Revolutions* spearheaded this historicist critique of the positivist conception of science, and raised far-reaching questions about the critical values usually associated with modern science. These questions about rational scientific inquiry also have important critical implications for our general conception of rationality; they provide much of the focus for the succeeding topics we discuss.

Many of the questions about rationality and scientific inquiry, though raised by Kuhn as diachronic issues in the history of science, have analogues in synchronic problems about the rationality of other conceptual schemes. Discussion of these issues leads naturally to the question of relativism. Is it permissible, or merely culturally chauvinist, to criticize cultures whose explanations rely on the magical rather than the scientific? What are the standards for cross-cultural comparisons of belief-systems? Are these questions in any way different from the examination and evaluation of sub-systems within our own culture?

Much recent work in the philosophy of the social sciences bears directly on this cluster of problems. We introduce the central positions as a debate about interpretation in social anthropology, and connect these views with the previously discussed topics of rational inquiry and the nature of scientific explanation.

Then we move from questions about the rationality of others to a rather different challenge to our own rationality; ironically, from *within* science this time. We look at some prominent results of the experimental psychologists Nisbett and Ross as well as the findings of Tversky and his colleagues. They maintain that human decision and choice behavior in experimental settings frequently violates elementary constraints of rationality. Their results are

controversial, and raise deep questions about several of the issues we have already examined.

Finally, we consider an important emerging perspective which runs counter to the traditional picture of scientific inquiry, knowledge, and explanation: feminist epistemology. This label covers a variety of distinct positions; here we concentrate on some central themes relevant to the issues we have been considering. Of particular interest for our purposes is the feminist claim that the male-dominated scientific picture of "conquering and controlling" nature is seriously flawed, and should be replaced with an alternative model emphasizing our unity with nature.

We regard "Knowledge, Rationality and Science" as a first course in philosophy. It assumes no previous philosophical background. We have listed extensive readings for each topic, far more than could be covered effectively in a quarter or a semester. We have starred [*] readings desirable for any version of the course, and indicate [+] readings which are particularly advanced or difficult. Within these parameters, instructors can select readings best suited to particular course objectives and clientele. Obviously, a number of different emphases are possible. This flexibility is a desirable feature of a course designed to stress the interrelations of a number of important topics. While the course structure is designed for large introductory classes, it is also especially suitable for an honors course, or as an honors section of an introductory course.

Cross Reference

For additional readings on the themes developed in this course, see also "Rationality" in the "Contemporary Sources" section (pp. 26-28) and "Epistemology and the Philosophy of Science" (especially sections V, VI and VIII) in the "Bridge Courses" section (pp. 92-101).

Topics and Readings

Section I. Descartes.

What is certain knowledge?

How might scientific knowledge be attained?

Are there methods rational persons must follow if they are to attain truth?

Skepticism: Is knowledge possible?

Can skeptical doubt be removed? How? The problem of the criterion and the problem of circularity.

Experience and Individualism: "The Cartesian Basis."

Readings

- * Descartes. *Meditations*. *Meditations I-III*.

- * Descartes. *Discourse on Method*. Parts One and Two. The new Cottingham, Stoothoff, Murdoch translation, *The Philosophical Writings of Descartes*, 2 volumes, Cambridge University Press, 1985, is highly recommended.

Peirce, C. S. "Questions Concerning Certain Faculties Claimed for Man." A critique of Descartes' project from a pragmatist point of view.

Stroud, B. *The Significance of Philosophical Scepticism*. See especially chapter 2. Very helpful and persuasive in explaining Descartes' project in intuitive terms and for bringing alive the skeptical arguments of *Meditation I*.

Section 2. *The Ethics of Belief.*

Is the origin of one's belief relevant to whether one has the right to be sure about the content of those beliefs?

May a rational person believe anything s/he chooses?

What are the constraints, if any, on reasonable or rational belief?

What is the relation between believing and acting?

Readings

- * Clifford, W. K. "The Ethics of Belief."
- * James, W. "The Will To Believe."

These articles are widely reprinted in anthologies: e.g., *Philosophy: The Basic Issues*, Klemke, Kline and Hollinger (eds.), New York: St. Martin's Press, 1982, pp. 53-64.

Section 3. *Scientific Knowledge, Causation, Induction and Scientific Method*

Can we obtain knowledge about the world through induction?

What is causation?

Mill's Methods.

The emergence of scientific method.

Readings

- + Hacking, I. *The Emergence of Probability*. Helpful background reading.
- * Hume, D. *An Inquiry Concerning Human Understanding*. Especially Sections I-V.

Mackie, J. L. "Mill's Methods of Induction." In Paul Edwards (ed.), *Encyclopedia of Philosophy*. Hereafter cited as 'Edwards'.

- * Russell, B. *The Problems of Philosophy*. (selections). Good statement of classical problems of induction and causation.

Section 4. Science and Scientism.

Scientific explanation as a paradigm for attaining knowledge, and as a paradigm of rational inquiry.

The deductive-nomological model.

Logical Positivism as the culmination of the Western scientific attitude.

Science as openness to criticism.

Creationism and science.

Readings

Ayer, A. J. *Language, Truth and Logic*. Classic, easily accessible statement of Logical Positivism.

- + Hempel, C. *Philosophy of Natural Sciences*.
- * Hesse, M. "Laws and Theories." In Edwards.
- * Kim, J. "Explanation in Science." In Edwards.
- * Kitcher, P. *Abusing Science*. Cambridge: MIT Press.
- + Nagel, E. *The Structure of Science*. (selections). New York: Harcourt, Brace & World.
- + Popper, K. See Miller, D. (ed.), *Popper: Selections*. Princeton University Press.

Section 5. Is Epistemology Dead? Reactions to the Prevailing Picture of Knowledge, Rationality and Inquiry.

Is the Western epistemological tradition based upon a mistake?
Are there perennial questions about knowledge, certainty, and the scope and limits of science which withstand Rorty's critique?

Readings

- + Hacking, I. "Is the End in Sight for Epistemology?" *Journal of Philosophy* (1978).

- * Rorty, R. *Philosophy and the Mirror of Nature*. (selections).
- + Difficult but important, influential, and effective if carefully introduced and discussed.

Stroud, B. "Why is Philosophical Scepticism Significant?" *Journal of Philosophy* (1985).

- + Wilson, M. "Skepticism Without Indubitability." *Journal of Philosophy* (1985).

Section 6. Reactions to the Orthodox Model of Scientific Explanation.

Does scientific explanation really proceed in the way the covering-law model says it does?

What does the history of science have to say about the nature of scientific discovery, scientific explanation, and scientific rationality?

Readings

Feyerabend, P. "How to be a Good Empiricist." *Against Method: Science in a Free Society*.

- + Goodman, N. *Fact, Fiction and Forecast*. Hackett Publishing Company.

Hacking, I. (ed.). *Scientific Revolutions*. Oxford University Press. Excellent source for material by, and in reaction to, Kuhn. Contains a helpful bibliography.

- * Hacking, I. "Styles of Scientific Reasoning." In J. Rajchman and C. West (eds.), *Post-Analytic Philosophy*, Columbia University Press. Excellent bridge article between this topic and the next.

Kuhn, T. *The Copernican Revolution*. University of Chicago Press. Good supplementary reading to 'Structure'.

- * Kuhn, T. *The Structure of Scientific Revolutions*. University of Chicago Press.

Lakatos, I. and Watkins, J. *Criticism and the Growth of Knowledge*. Cambridge University Press.

- + Laudan, L. *Progress and Its Problems*. University of California Press.

Morick, H. (ed.). *Challenges to Empiricism*. (selections).
Good source for readings in positivist philosophy of science as well as for criticisms of the positivist program.

Section 7. Rationality and Relativism.

Is knowledge a social construct?
Are standards of rationality culture-relative?
Is it possible to compare cross-cultural beliefs and practices?
Is it possible to evaluate or criticize the beliefs and practices of an alien conceptual scheme? If so, how? If not, why not?

Readings

Hollis, M. and Lukes, S. (eds.). *Rationality and Relativism*. MIT Press. See especially articles by Barnes and Bloor, and Hacking.

Wilson, B. (ed.). *Rationality*. Blackwell. See especially articles by MacIntyre and Hollis. Hereafter cited as 'Wilson'.

- * Winch, P. *The Idea of a Social Science*. (selections).
- * Winch, P. "Understanding a Primitive Society." *American Philosophical Quarterly* (1965). Reprinted in Wilson.

Section 8. Human Irrationality: A Scientific Result?

Are human belief-forming mechanisms reliable?
Are we really as rational as we like to think we are?

Readings

Cohen, L. J. "Can Human Irrationality Be Experimentally Demonstrated?" *The Behavioral and Brain Sciences* (1981).

Goldman, A. I. *Epistemology and Cognition*. Cambridge, Mass: Harvard University Press, 1986. (selections). Chapter 14 elegantly summarizes, with critical discussion, some of the central Tversky and Nisbett-Ross results.

- * Kahneman, D., Slovic, P. and Tversky, A. *Judgment Under Uncertainty: Heuristics and Biases*. (selections).
- * Nisbett, R. and Ross, L. *Human Inference: Strategies and Shortcomings of Social Judgment*. (selections).

Section 9. Feminist Epistemology.

Are there alternative ways of doing science?

How might gender affect one's conception of scientific inquiry?

Readings

Harding, S. *The Science Question in Feminism*. Ithaca: Cornell University Press, 1986.

Hintikka, M. and Harding, S. (eds.). *Discovering Reality*. Reidel.

- * Jaggar, A. *Feminist Politics and Human Nature*. Rowan and Allenheld. See especially chapter 7.
- * Keller, E. F. *A Feeling for the Organism*. Biography of Barbara McClintock.

Cross Reference

For additional readings on some of the themes in this course, see also "Epistemology and the Philosophy of Science" in the "Bridge Courses" section (pp. 92-101).

**Introduction to Philosophy
(Emphasizing Epistemology)**

CONTRIBUTORS: Joshua Hoffman, Gary Rosenkrantz.

In this course students are introduced to philosophy through readings in classical modern philosophers. The historical material is organized around certain central problems in philosophy, especially ones in epistemology. Related issues in metaphysics are also covered. The course consists of four parts: a preliminary section in which basic concepts are introduced; a second part on Descartes and Rationalism; a third section on Berkeley's Empirical Idealism; and a final part on Russell's Scientific Realism. All readings are from original sources in inexpensive paperback editions.

A detailed syllabus which gives the topics and associated readings for each day of the course is provided below. In addition, partial lecture notes, including representative arguments which may be discussed, are given.

Texts

Descartes, R. *Meditations*. (Bobbs-Merrill edition).

Berkeley, G. *Three Dialogues*. (Bobbs-Merrill edition).

Russell, B. *The Problems of Philosophy*. (Oxford).

Topics and Readings

Part I: Introduction to Deductive Logic.

Day 1: Theories of truth; propositions versus sentences.

Reading: handout (glossary of terms).

Theories of truth are discussed and compared: correspondence theory, subjective theory, and coherence theory. An argument against certain forms of the subjective theory is discussed: since the middle ages the shape of the earth has not changed, even though people's beliefs about it have changed. Propositions as bearers of truth values are discussed and distinguished from sentences.

Day 2: Necessity, Contingency, Possibility, Impossibility.

Reading: handout (glossary of terms).

Modal concepts defined both in terms of possible worlds and subjunctive conditionals.

Day 3: *A Priori/A Posteriori*.

Reading: handout (glossary of terms).

The distinction between *a priori* and *a posteriori* knowledge is introduced:

p is knowable *a priori* if and only if (i) understanding p is sufficient for coming to know p , or (ii) p is deducible from a proposition that satisfies (i).

p is knowable *a posteriori* if and only if p is not knowable *a priori*.

Day 4: Validity and Invalidity of Arguments.

Reading: handout (glossary of terms).

Various definitions and distinctions concerning arguments are introduced. Examples of various valid and invalid arguments and argument forms are discussed.

An argument is a set of two or more propositions, one of which is a conclusion, and the rest of which are premises. An argument is valid if and only if necessarily, if its premises are true, then its conclusion is true.

An argument is invalid if and only if possibly, its premises are true and its conclusion is false.

An argument is sound if and only if possibly, its premises are true and its conclusion is false.

An argument is unsound if and only if it is either invalid or has a false premise.

Day 5: Syllogistic Forms.

Reading: handout of forms.

Definition of syllogism is given; limitations of syllogistic logic are discussed. (See Ackrill, *Aristotle the Philosopher*, for a good discussion of syllogistic logic). Examples, including common forms.

Day 6: Propositional Forms.

Reading: handout of forms.

Definition of a propositional argument is given. Limitations of propositional logic are discussed. Examples, including common forms (modus ponens, modus tollens, etc.).

Day 7: Unit Exam.

Part II: Descartes and Rationalism.

Days 8 and 9: Descartes, The Crisis of Belief, and the Scientific Revolution.

Discrediting of the method of authority by the scientific revolution. Descartes' search for a scientific method. His assumption of the axiomatic method because of the success of mathematics and its close connection with science.

Day 10: Philosophical Analysis. The Concept of Knowledge. Skepticism.

Reading: Russell, chapter 13.

Analysis of a concept in terms of necessary and sufficient conditions. Knowledge as justified true belief. Examples of unjustified true belief, justified false belief. A good example for illustrating necessary and sufficient conditions is the concept of a bachelor (unmarried, male, adult, human, never married before...).

Day 11: The Axiomatic Method in Epistemology. The Role of the Method of Doubt.

Reading: Descartes, *Meditation I*.

Discussion of foundationalism in epistemology, Descartes' method as foundational, Euclidean Geometry--Descartes' model, the method of doubt and the search for axioms.

Days 12, 13: Descartes' Skeptical Arguments: Sensory Illusions, Dreaming, and the Evil Demon.

Reading: Descartes, *Meditation I*.

Descartes' skeptical arguments. Examples:

Sense-Perception Argument:

- (1) Beliefs based on a source of information which is sometimes mistaken are uncertain.
- (2) Sense-perception is a source of information which is sometimes mistaken, e.g., illusions, mirages, etc.
- (3) Beliefs based on sense-perception are uncertain.
- (4) Beliefs about physical objects or persons other than oneself are based on sense-perception.
- (5) Beliefs about physical objects or persons other than oneself are uncertain.

Dream Argument:

- (1) For any waking experiences, it is possible for one to have dream experiences which are indistinguishable in their qualitative sensory content from those waking experiences.
- (2) If so, then one can never know for certain whether one is awake or dreaming.
- (3) If so, then one can never know for certain anything about physical objects or persons other than oneself.

Discuss Evil Demon argument.

Day 14: The Cogito and Other Axiomatic Truths.

Reading: Descartes, *Meditation II*.

Discussion of the fact that it is impossible to be mistaken if you think that you exist, or think that you think, etc.

Days 15, 16: Descartes' Conception of the Self, and the Mind/Body Problem.

Reading: Descartes, *Meditation II*.

Definitions of accidental and essential properties.

P is an essential property of $x = df.$ (i) x has P , and (ii) it is impossible for x to exist and lack P .

P is an accidental property of $x = df.$ (i) x has P , and (ii) it is possible for x to exist and lack P .

Descartes' argument that he is essentially a thinking thing:

- (1) If, in order to know that x exists for certain you have to know that x has P , then P is essential to X .
- (2) In order to know for certain that I exist, I have to know for certain that I think.
- (3) Thinking is essential to me.

Definitions of materialism, dualism, etc. Considerations of some arguments in favor of dualism. Examples:

- (1) I know for certain that I exist.
- (2) I do not know for certain that my body exists.
- (3) I am not identical with my body.

- (1) When I die, I cease to exist.
- (2) After death, my body continues to exist.
- (3) I am not identical with my body.

Day 17: Knowledge of Bodies: The Piece of Wax Argument.

Reading: Descartes, *Meditation II*.

Consideration of various arguments in Descartes. Examples:

Piece of Wax Argument:

- (1) Knowledge of bodies is knowledge of their essential properties.
- (2) All of the particular sensible properties of bodies can change while the bodies continue to exist.
- (3) All of the particular sensible properties of bodies are accidental properties.
- (4) There is no knowledge of bodies by means of the senses.

The mind is more easily known than the body:

- (1) If in order to know that X exists, you must know that Y exists, but not *vice versa*, then Y is more easily known than X .
- (2) In order to know that a body exists, you must know that your mind exists, but not *vice versa*.

(3) Therefore, mind is more easily known than body.

Day 18: The Ascent from Foundation.

Reading: Descartes, *Meditation III*.

Discussions of Descartes' plan: I exist, I think, I have certain ideas --> God exists --> the external world exists.

Days 19, 20: Arguments for the Existence of God.

Reading: Descartes, *Meditation III*.

Definitions of formal and objective reality, degrees of reality.
Discussion of Descartes' proof for the existence of God.

- (1) I have an idea of God (a perfect being).
- (2) The idea of God has infinite objective reality.
- (3) If an idea has infinite objective reality, then its cause has infinite formal reality.
- (4) Only God can have infinite formal reality.
- (5) God is the cause of my idea of God.

Day 21: Unit Exam.

Part III: Berkeley's Empirical Idealism.

Day 22: Locke: Primary and Secondary Qualities, and the Representational Theory of Perception.

Representational theory of perception, Locke's definitions of primary and secondary qualities. Definitions of direct realism and indirect realism.

Day 23: Berkeley's Empiricism.

Berkeley's general aims: to refute the skepticism inherent in Representational (Indirect) Realism; to combat atheistic tendencies of modern science; and to defend "common sense".

Days 24-26: Berkeley's Attack on Representational Realism.

Reading: Berkeley, *First Dialogue*.

Berkeley's relativity of sense-perception argument; the parity between primary and secondary qualities. Example:

Heat/Pain Argument:

- (1) If something is indistinguishable from a pain, then it is a pain.

- (2) A great degree of heat is indistinguishable from a pain.
- (3) A great degree of heat is pain.
- (4) A pain cannot exist unperceived.
- (5) A great degree of heat cannot exist unperceived.
- (6) If a great degree of heat cannot exist unperceived, then no degree of heat can exist unperceived.
- (7) No degree of heat can exist unperceived.

Other Arguments of Berkeley Against Representational Realism:

- (1) Houses, mountains and trees are objects of the senses.
- (2) The objects of the senses are ideas.
- (3) Ideas cannot exist unperceived.
- (4) Houses, mountains and trees cannot exist unperceived.

In support of (2):

- (1) Whatever is perceived is immediately perceived.
- (2) Only ideas are immediately perceived.
- (3) Only ideas are perceived.

In support of the premise that all perception is immediate, consider Berkeley's distinction between perception and inference.

Days 27-29: Berkeley's Critique of the Notion of Matter.

Reading: Berkeley, *Second Dialogue*.

Berkeley's critique of matter. Empiricist conception of meaning: all concepts derive from what we directly experience. At best we only experience properties, and not any underlying matter. Hence, the notion of matter has no empirical content, and is meaningless.

- (1) Matter can, by definition, exist unconceived.
- (2) It is impossible to conceive of a material object which is unconceived of.
- (3) Matter is impossible.
- (1) Matter is defined in terms of size, shape, etc.
- (2) The size, shape, etc., of matter resemble our ideas of them.
- (3) An idea can only resemble another idea.
- (4) Size, shape, etc., are ideas.
- (5) Matter, by definition, can exist unperceived.
- (6) Ideas cannot exist unperceived.
- (7) The properties of matter cannot exist unperceived.
- (8) Matter cannot exist unperceived.
- (9) Matter is impossible.

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Days 30-32: Berkeley's Defense of Idealism.

Reading: Berkeley, *Third Dialogue*.

How the idealist distinguishes dreaming from waking, veridical from nonveridical perception. How the idealist can say that houses, cats, and trees persist when we are not observing them. How the idealist can do science.

Discussion of some difficulties with Berkeley's views.
Discussion of whether Berkeley's view or Locke's view is a better explanation of experience.

Day 33: Unit Exam.

Part IV: Russell and Scientific Realism.

Days 34-36: Appearance and Reality; the Existence and Nature of Matter.

Reading: Russell, chapters 1-3.

The relativity of sense-perception argument for primary and secondary qualities. The scientific argument for this distinction between primary and secondary qualities. Russell's defense of scientific realism. Russell's argument that realism is a better explanation of our experience than is idealism. Criteria for inference to the best explanation.

Days 37-38: Knowledge by Acquaintance and Knowledge by Description.

Reading: Russell, chapter 5.

The extent and modes of knowledge by acquaintance. Knowledge by acquaintance as foundational. Definition of knowledge by description. Knowledge by description as ascent from the foundation. Russell's theory of proper names and demonstratives. The role of knowledge by description in the realist program.

Days 39-41: Inductive Reasoning and the Problem of Induction.

Reading: Russell, chapter 6.

The difference between inductive and deductive reasoning. Hume's problem of induction. Russell's *a prioristic* reply to Hume.

Days 42-44: Universals and Particulars.

Reading: Russell, chapters 9 and 10.

Definitions of universals and particulars. Russell's theory of knowledge of universals: by abstraction from experience of particulars. Russell's theory that *a priori* knowledge of the relations of universals. Platonism versus nominalism.

Formal Cause Argument:

- (1) Morris, Felix and Garfield are all cats.
- (2) There must be something about them which accounts for all of them being cats.
- (3) This something can only be their catness.
- (4) There is catness.

Translation argument: there are truths about universals which cannot be translated into truths solely about concrete things, e.g., "there are shapes which are unexemplified."

Introduction to Epistemology: A Topical Approach

CONTRIBUTORS: William Morris, Kevin Possin.

This course is an upper-division undergraduate introduction to epistemology which concentrates on the analysis of knowledge and the theory of justification. It presupposes a general introduction to philosophy at the freshman and sophomore level. It begins with the traditional justified true belief account of knowledge, and charts some of the problems which have been raised for that analysis, beginning with Gettier's classic paper of 1963. The course follows the structure of subsequent attempts to provide a theory of justification.

Texts

Roth, M. and Galis, L. (eds.). *Knowing: Essays in the Analysis of Knowledge*. University Press of America. Hereafter cited as 'R&G'.

Pappas, G. and Swain, M. (eds.). *Essays on Knowledge and Justification*. Cornell University Press. Hereafter cited as 'P&S'.

Topics and Readings

Section 1. Preliminaries: Introductory Concepts

Definition and analysis: necessary and sufficient conditions.

Counter-examples. Philosophically informative analyses versus dictionary definitions.

Section 2. The Traditional Analysis of Knowledge

- Ayer, A. J. *The Problems of Knowledge*, chapter 1.
 Chisholm, R. *Theory of Knowledge*.
 Comman, J. and Lehrer, K. *Philosophical Problems and Arguments*, chapter 2.
 Russell, B. *The Problems of Philosophy*.

Section 3. The Belief Condition

- Lehrer, K. "Belief and Knowledge." *Philosophical Review* (1968).
 Radford, C. "Knowledge By Examples." (R&G).

Section 4. The Justification Condition

- Gettier, E. "Is Justified True Belief Knowledge?" (R&G).
 Lehrer, K. "Knowledge, Truth and Evidence." (R&G).
 Sosa, E. "The Analysis of Knowledge that *p*." *Analysis* (1964).
 Unger, P. "An Analysis of Factual Knowledge." (R&G).

Section 5. Knowledge and Coincidence

- Cargile, J. "On Near Knowledge." *Analysis* (1969).
 Malcolm, N. "Knowledge and Belief." (R&G).

Section 6. The Conclusive Reasons Approach

- Dretske, F. "Conclusive Reasons." (P&S).
 Pappas, G. and Swain, M. "Some Conclusive Reasons Against 'Conclusive Reasons'." (P&S).

Section 7. The Causal Theory

- Goldman, A. I. "A Causal Theory of Knowing." (R&G), (P&S).
 Skyrms, B. "The Explication of '*x* knows that *p*'." (R&G).
 Swain, M. "Knowledge, Causality and Justification." (P&S).

Section 8. Defeasibility: A Fourth Condition for Knowledge

- Annis, D. "Knowledge and Defeasibility." (P&S).
 Lehrer, K. and Paxson, T. "Knowledge: Undefeated Justified True Belief." (P&S).
 Lycan, W. and McCall, M. "The Catastrophe of Defeat." *Philosophical Studies* (1975).
 Swain, M. "Epistemic Defeasibility." (P&S).

Section 9. Evidence Which One Does Not Possess

- Harman, G. "Selections from *Thought*." (P&S).
 Lycan, W. "Evidence Which One Does Not Possess." *Australasian Journal of Philosophy* (1976).

Section 10. Relevant Alternatives

Goldman, A. I. "Discrimination and Perceptual Knowledge."
(P&S).

Section 11. Coherence

BonJour, L. "The Coherence Theory of Empirical Knowledge."
Philosophical Studies (1976).
Lehrer, K. "Systematic Justification: Selections from
Knowledge." (P&S).

Section 12. Reliabilism

Goldman, A. I. "What Is Justified Belief?" In G. Pappas (ed.),
Knowledge and Justification.
Kornblith, H. "Beyond Foundationalism and the Coherence
Theory." *Journal of Philosophy* (1980).

Skepticism

CONTRIBUTOR: William Morris.

This course is a one-quarter upper-level introductory course in epistemology. "Problems of Philosophy," a three-quarter introductory sequence, is formally a prerequisite. Frequently, however, students enroll who have not had "Problems," so "Skepticism" presupposes no substantial philosophical background.

Texts

Descartes, R. *The Philosophical Works of Descartes*. Cottingham,
Stoothoff and Murdoch, (tr.). Cambridge University Press, 1985.

Stroud, B. *The Significance of Philosophical Scepticism*. Oxford
University Press, 1984.

Peirce, C. S. *Selected Writings of Peirce*. Routledge & Kegan Paul.

Moore, G. E. *Philosophical Papers*. Allen and Unwin.

Assorted readings to be distributed in class.

Topics and Readings

Weeks 1 and 2: Descartes.

Reading: *Meditation I*.

We begin with an extended examination of *Meditation I*. I stress the motivation for the method of doubt, Descartes' conception of experience, and the structure of the skeptical arguments in context. At this point, my concern is not with evaluating the arguments, but with carefully determining what they are. I emphasize that, despite Descartes' lucidity, this is no easy matter. I introduce some prominent readings of these arguments. We critically evaluate these as we develop our own account of the structure of *Meditation I*.

Weeks 3 and 4: Criticisms of Descartes.

Readings: Bouwsma, O. K. "Descartes' Evil Genius." From his *Philosophical Essays*, University of Nebraska Press.

Peirce, C. S. "Questions Concerning Certain Faculties Claimed for Man." From *Selected Writings of Peirce*.

Peirce, C. S. "Some Consequences of Four Incapacities." In *Selected Writings of Peirce*.

Haack, S. "Descartes, Peirce and the Cognitive Community." *The Monist* (1981).

At this point, the students are anxious to criticize Descartes' arguments. Examining classic articles which express some of their critical points is a useful way of encouraging them to express their criticisms. Not incidentally, a critical approach to these pieces also encourages reflective self-criticism. I use Bouwsma's "Descartes' Evil Genius" to introduce analytic criticisms of Cartesian skepticism. We look closely at some of the analytic tools Bouwsma's critique involves, especially the paradigm-case argument and the argument from excluded opposites.

Peirce's objections to Descartes effectively express the natural reaction that Cartesian doubt is unreal or artificial. Susan Haack's paper, "Descartes, Peirce and the Cognitive Community," is also useful in setting out the issues involved.

Week 5: The Philosophical Significance of Skepticism.

Reading: Stroud, B. "The Problem of the External World." In *The Philosophical Significance of Scepticism*. Oxford University Press.

Criticisms of these arguments against Descartes leave things in flux. Students remain unconvinced by the skeptical arguments of *Meditation I*, but realize that refuting them is more difficult

than they first thought. This is a good point to begin Barry Stroud's *The Significance of Philosophical Scepticism*. Stroud's initial chapters go over some of the same ground, and reinforce the moral that there is no easy refutation of skepticism.

Week 6: G. E. Moore.

Readings: Moore, G. E. "Four Forms of Scepticism." From his *Philosophical Papers*. Allen and Unwin.

Moore, G. E. "Certainty." Also in *Philosophical Papers*.

Stroud's discussion leads naturally to Moore's classic papers, "Certainty" and "Four Forms of Scepticism." We look at these pieces in some detail. Stroud's chapter on Moore is helpful in looking at these arguments sympathetically but critically.

Week 7: Analytic Responses to Skepticism.

Readings: Malcolm, N. "Knowledge and Belief." From his collection of papers, *Knowledge and Certainty*. Cornell University Press.

Cavell, S. Selections from *The Claim of Reason*. Oxford University Press.

Next we move to two analytic responses to skepticism influenced by Austin and Wittgenstein: Norman Malcolm's paper "Knowledge and Belief" and selections from Stanley Cavell's *The Claim of Reason*. Considering what is right and what is wrong with their arguments is excellent preparation for appreciating *On Certainty*.

Weeks 8 and 9: Rorty's challenge to epistemology.

Readings: Rorty, R. *Philosophy and the Mirror of Nature*. Princeton University Press. (selections).

Hacking, I. "Is the End in Sight for Epistemology?" *Journal of Philosophy* (1978).

Wilson, M. "Skepticism Without Indubitability." *Journal of Philosophy* (1984).

Stroud, B. "Scepticism and the Possibility of Knowledge." *Journal of Philosophy* (198).

Though his views are not directly concerned with skepticism, I include selections from Richard Rorty's *Philosophy and the*

Mirror of Nature. Rorty's challenge to the entire epistemological enterprise can be seen as a way of eliminating the problem along with the attempt to find an indubitable basis for knowledge. The papers by Hacking, Wilson and (especially) Stroud provide a good critical perspective on Rorty's claims.

Week 10: Wittgenstein.

Readings: Wittgenstein, L. *On Certainty*. Blackwell, (selections).

Cook, J. "Wittgenstein's Refutation of Skepticism."
Philosophical Investigations (1985).

The final part of the course is devoted to Wittgenstein's *On Certainty*. I don't try to cover everything in that difficult work. Instead, I concentrate on one of Wittgenstein's central lines of argument, his characterization of skeptical doubt and his argument that skeptical doubt, so characterized, is incoherent. I stress the resemblances, as well as the differences, between forms of argument Wittgenstein uses, and the analytic responses to skepticism we have looked at during the course. Discussion of these arguments effectively summarizes much of the course's content and structure, and allows us to assess, at least tentatively, the progress we have made in understanding the various facets of the problem of skepticism.

BRIDGE COURSES

While epistemology can be taught as a relatively self-contained subject, there are also important links between epistemology and other fields: both intra-philosophical and extra-philosophical fields. This section of the booklet makes some proposals and provides some bibliographies for bridge courses that explore a few of these links. One subsection describes approaches to the interface between epistemology and cognitive psychology (or, more broadly, cognitive science). A second describes approaches to the overlap between epistemology and the philosophy of science. A third catalogues the literature on the interpretation of probability and its bearing on problems of inductive inference. A fourth focuses on epistemological ramifications of current linguistic theory. In all cases the relevant literature might be organized differently with equal or greater fruitfulness. Many proposals are more in the nature of suggestive ideas than attempts to provide orthodox or definitive structures to the bridge areas.

SAMPLE COURSES

Epistemology and Psychology

CONTRIBUTORS: John Biro, Alvin Goldman, Mark Rollins, Joe Tolliver.

This unit presents three possible courses to link epistemology with cognitive psychology (or cognitive science). The first is an *eclectic* course, using several different epistemological programs that delineate bridges with cognitive science. The second chooses a *single* epistemological program--that of "primary epistemics"--and works through its theoretical foundations and its style of allying epistemology with psychology. The third course focuses on a single *topic* within epistemology--perception--and presents material from both the philosophical and psychological literature. A syllabus is given for each course, though all syllabi include more material (at least as optional readings) than could realistically be covered in a single semester. Instructors should select what seems most promising to them.

Division of the unit:

1. Epistemology and Cognitive Psychology (p. 80)
2. The "Primary Epistemics" Program (p. 85)
3. Perception, Perceptual Belief, and Knowledge (p. 87)

Cross Reference

For a discussion of the relationship between epistemology and psychology, see also "Naturalistic Epistemology" in the "Contemporary Sources" section (pp. 23-25).

Epistemology and Cognitive Psychology

CONTRIBUTOR: Mark Rollins.

In this module, two different approaches are used to illustrate how a course examining the overlap between epistemology and cognitive psychology might be developed. The first begins with cognitive psychology, and considers a variety of topics which bear upon epistemology. It then moves to selected works in epistemology to see how psychological research and theory have influenced the way philosophers consider knowledge. Materials in this course are denoted by a '+'. The second approach is topical, and lists both philosophical and psychological literature under each topic. Items in this course are denoted by a '*'.

Division of the bibliography:

- I. Introduction
- II. Epistemology
 - A. Reliabilism
 - B. Information Theory
 - C. Explanatory Coherence
- III. Psychology
 - A. Methodological Issues
 - B. Perception
 - C. Memory
 - D. Imagery
 - E. Belief Revision

Cross References

For additional readings on perception, see also "Perception" in the "Contemporary Sources" section (pp. 15-16), and the syllabus "Perception, Perceptual Belief and Knowledge" in this section (pp. 87-92).

For additional readings on memory, see "Memory" in the "Contemporary Sources" section (pp. 13-15).

Readings

I. *Introduction*

- + Goldman, A. I. "The Relation Between Epistemology and Psychology." *Synthese* 64 (1985), 29-68.
- + Sosa, E. "Nature Unmirrored, Epistemology Naturalized." *Synthese* 55 (1983), 49-72.
- + Quine, W. V. "Epistemology Naturalized." In *Ontological*
- * *Relativity and Other Essays*. New York: Columbia University Press, 1969, 69-90.

Quine, W. V. "Natural Kinds." In *Ontological Relativity and Other Essays*. 1969, 114-38.

II. *Epistemology*

A. Reliabilism

- + Goldman, A. I. *Epistemology and Cognition*. Cambridge, Mass.: Harvard University Press, 1986. Introduction, chapters 1, and 3-6.

B. Information Theory

- + Dretske, F. "The Epistemology of Belief." *Synthese* 55, 3-19.
- + Dretske, F. *Knowledge and the Flow of Information*.. Cambridge, Mass.: The MIT Press, 1981. Chapters 4-6.

C. Explanatory Coherence

- + Harman, G. *Change in View*. Cambridge, Mass.: The MIT Press, 1986. Chapters 1-4.

III. *Psychology*

A. Methodological Issues

- Fodor, J. "Methodological Solipsism Considered as a Research Strategy in Cognitive Psychology." *Behavioral and Brain Sciences* 3, 1 (1980), 63-73. Argues for a formality condition on mental state individuation, insisting on the necessity of computational versus naturalistic psychology. See also "Commentary and Replies."
- + Haugeland, J. "The Nature and Plausibility of Cognitivism."
- * *Behavioral and Brain Sciences* 2 (1978), 215-60. Distinguishes three modes of explanation: deductive-nomological, morphological, and systematic; and argues that the latter is

distinctive of cognitive sciences. See also "Commentary and Replies."

- + Pylyshyn, Z. "Computation and Cognition: Issues in the Foundations of Cognitive Science." *Behavioral and Brain Sciences* 3 (1980), 111-32. Defines two methodological conditions--strong equivalence and cognitive penetrability--on mental representation as a construct in psychological theory. See also "Commentary and Replies."

B. Perception

- * Dretske, F. "The Role of the Percept in Visual Cognition." In Savage, C. W. (ed.), *Perception and Cognition. Minnesota Studies in the Philosophy of Science* 9. Minneapolis: University of Minnesota Press, 1978.
 - * Goldman, A. I. "Discrimination and Perceptual Knowledge." *Journal of Philosophy* 73 (1976), 771-91.
 - * Goldman, A. I. *Epistemology and Cognition*. Cambridge, Mass.: Harvard University Press, 1986. See especially chapter 9.
 - + Gibson, J. J. "The Perception of Affordance." In Gibson (ed.), *The Ecological Approach to Visual Perception*. Boston: Houghton-Mifflin, 1979.
- Harman, G. *Thought*. Princeton: Princeton University Press, 1973. See especially chapter 11.
- + Lindsay, P. and Norman, D. *Human Information Processing: An Introduction to Psychology*. 2nd ed. New York: Academic Press, 1972. See especially chapter 1, "Human Perception". An account of feature analysis.
 - + Pinker, S. "Visual Cognition: An Introduction." In Pinker, S. (ed.), *Visual Cognition*. Cambridge, Mass.: MIT Press/Bradford Books, 1985. An overview: templates, features, Fourier analysis, Marr-Nishihara, parallel models. Theories of recognition and imagery.
 - + Marr, D. and Nishihara, H. K. "Representation and Recognition of the Spatial Organization of Three-Dimensional Shapes." *Proceedings of Royal Society of London* 200 (1978), 269-94. Computational approach.

C. Memory

- + Anderson, J. R. *Cognitive Psychology and Its Implications*. (2nd ed.) New York: W. H. Freeman Co, 1985. See especially chapters 6 and 7.
- + Cherniak, C. "Rationality and the Structure of Human Memory." *Synthese* 57 (1983), 163-86.
- * Dretske, F. and Yourgrau, P. "Lost Knowledge." *Journal of Philosophy* 80 (1983), 356-67.

Goldman, A. I. *Epistemology and Cognition. op. cit.* See especially chapter 10.

Martin, C. B. and Deutscher, M. "Remembering." *Philosophical Review* 75 (1966), 161-96.

Miller, G. A. "The Magical Number Seven, Plus or Minus Two." *Psychology Review* 63 (1986), 81-97.

Neisser, U. "Memory: What Are the Important Questions?" In Neisser, U. (ed.), *Memory Observed: Remembering in Natural Contexts*. San Francisco: W. H. Freeman and Co., 1978.

D. Imagery

- + Block, N. "What Is the Issue?" In Block, N. (ed.), *Imagery*. Cambridge, Mass.: MIT Press/Bradford Books, 1981. Hereafter cited as 'Block'. An analysis of articles aimed at identifying the issues and defining positions.
- Brown, R. and Herrnstein, R. "Icons and Images." In Block, 1981. A summary of recent empirical studies, particularly Shepard, Cooper, Metzler and colleagues.
- * Dennett, D. "The Nature of Images and the Introspective Trap." In Block, 1981. Philosophical arguments for a version of Descriptonalism.
- * Fodor, J. "Imagistic Representation." *The Language of Thought*. New York: Thomas Crowell, 1975. Reprinted in Block. Arguments against an iconic mentalese with some indication of how there might be restricted roles for images.

Goldman, A. I. *Epistemology and Cognition*. See especially chapter 12, "Internal Codes." Distinguishes two versions of the debate, the pictorial versus descriptonal form and the

perceptual-similitude form. Discusses applications of imagery to tasks.

- + Kosslyn, S. M. and Pomeranz, J. R. "Imagery, Propositions, and the Form of Internal Representations." In Block, N. (ed.), *Readings in Philosophy of Psychology, Volume II*, Cambridge, Mass.: MIT Press/Bradford Books. A well-developed Pictorialism on the computational model. Answers objections to earlier writings.
- + Pylyshyn, Z. "The Imagery Debate: Analog Media Versus Tacit Knowledge." *Psychological Review* 88 (1981), 16-45. A critique of Kosslyn and a defense of Descriptionism as essential to the computational model, largely on meta-theoretical grounds.

Schwartz, R. "Imagery -- There's More to It Than Meets the Eye." In Block. Identifies complexities in the debate by considering similarities and dissimilarities between pictures and propositions.

E. Belief Revision

Feldman, R. forthcoming. "Rationality, Reliability, and Natural Selection." *Philosophy of Science*.

Goldman, A. I. *Epistemology and Cognition*. See especially chapter 14.

- + McCarthy, J. and Hayes, P. "Some Philosophical Problems from the Standpoint of Artificial Intelligence." In B. L. Webber and N. J. Nilsson (eds.), *Readings in Artificial Intelligence*. Palo Alto: Tiago Publishing Co., 1981. Hereafter cited as 'McCarthy and Hayes'.

McCarthy, J. "Epistemological Problems of Artificial Intelligence." In McCarthy and Hayes.

- + Nisbett, R. and Ross, L. *Human Inference: Strategies and Shortcomings of Social Judgment*. Englewood Cliffs, N. J.: Prentice-Hall, 1980. See especially chapter 2.
- * Stich, S. "Could Man be an Irrational Animal?" In *Naturalizing Epistemology*. Kornblith, H. (ed.), Cambridge, Mass.: MIT Press/Bradford Press, 1985.
- + Tversky, A. and Kahneman, D. "Judgment Under Uncertainty:

- * Heuristics and Biases." In Kahneman, D., Slovic, P. and Tversky, A. (eds.), *Judgment Under Uncertainty: Heuristics and Biases*. Cambridge: Cambridge University Press, 1982, 3-20.

The "Primary Epistemics" Program

CONTRIBUTOR: Alvin Goldman

Principal Texts

Anderson, J. R. *Cognitive Psychology and Its Implications*, 2nd ed. W. H. Freeman, 1986. Hereafter cited as 'Anderson'.

Goldman, A. I. *Epistemology and Cognition*. Cambridge, Mass.: Harvard University Press, 1986. Hereafter cited as 'Goldman.'

Supplementary Texts: (* = philosophy)

- * Block, N. (ed.). *Imagery*. Cambridge, Mass.: MIT Press, 1981. Hereafter cited as 'Block.'

- * Cherniak, C. *Minimal Rationality*. Cambridge, Mass.: MIT Press, 1986. Hereafter cited as 'Cherniak.'

Fodor, J. *Modularity of Mind*. Cambridge, Mass.: MIT Press, 1983. Hereafter cited as 'Fodor.'

- * Harman, G. *Change in View*. Cambridge, Mass.: MIT Press, 1986. Hereafter cited as 'Harman.'

Kahneman, D. *et. al.*, (eds.). *Judgment Under Uncertainty*. Cambridge University Press, 1982. Hereafter cited as 'Kahneman *et. al.*'

- * Kornblith, H. (ed.). *Naturalizing Epistemology*. Cambridge, Mass.: MIT Press, 1985. Hereafter cited as 'Kornblith.'

- * Moser, P. (ed.). *Empirical Knowledge*. Rowman & Littlefield, 1986. Hereafter cited as 'Moser.'

Nisbett, R. and Ross, L. *Human Inference*. Prentice-Hall, 1980. Hereafter cited as 'Nisbett and Ross.'

Pinker, S. (ed.) *Visual Cognition*. Cambridge, Mass.: MIT Press, 1985. Hereafter cited as 'Pinker.'

Topics and Readings
 ([] = supplementary topics)

1. *Elements of Epistemology*
 Goldman: Introduction and chapter 1
 [Kornblith: selections by Quine]
2. *Skepticism*: Goldman, chapter 2
3. *Knowledge*
 Goldman: chapter 3
 [Moser: selections by Gettier, Harman, and Shope, etc.]
4. *Justification*
 Goldman: chapters 4, 5
 [Moser: selections by Alston, Chisholm, Bonjour, and/or Sosa]
5. *Problem-Solving*
 Anderson: chapter 8
 Goldman: chapter 6
- [6. *Truth and Realism*: Goldman, chapter 7]
7. *Perception*
 Anderson: chapter 3
 Goldman: chapter 9
 [Fodor: selected chapters]
 [Pinker: "Introduction"]
8. *Memory*
 Anderson: chapters 6, 7
 Goldman: chapter 10
 [Nisbett and Ross: chapter 8]
9. *Constraints on Representation*
 Goldman: chapter 11
 [Pinker: selections by Ullman and by Hoffman and Richards]
10. *Imagery*
 Anderson: chapter 4
 Goldman: chapter 12
 [Block and/or Pinker: selections]
 [Nisbett and Ross: chapter 3]
11. *Deductive Reasoning*
 Anderson: chapter 10

Goldman: chapter 13
 [Cherniak: selected chapters]
 [Harman: selected chapters]

12. *Probability Judgments*
 Goldman: chapters 14, 15, 16
 [Kahneman *et. al.*: selected chapters]
13. *Development of Expertise*
 Anderson: chapter 9
 Goldman: chapter 17

Perception, Perceptual Belief, and Knowledge

CONTRIBUTOR: Joseph Thomas Tolliver

This course is intended to provide the student with an introduction to issues and problems linking psychology, philosophy of mind, and epistemology. The idea is to introduce the student to some of the theories, methodologies, arguments, and results current in cognitive science, and to show their relevance to epistemology. Since it is a philosophy course, the topics and readings emphasize work in philosophy of mind/psychology and epistemology. As a result, no attempt is made at producing a representative sample of work in the psychology of perception. The goal in choosing the psychology literature is to give the student some feel for: (1) the phenomena that perceptual psychology undertakes to explain; (2) the role of theory in psychological research; (3) techniques and methodologies employed and their relation to theory; (4) results and successes, and (5) work yet to be done. The course is aimed at advanced undergraduates and graduate students who, ideally, have some background in one of the three areas.

Stars (*) indicate readings which are central to the discussions.

Cross Reference

For additional readings on the role of perception in epistemology, see "Perception" in the "Contemporary Sources" section (pp. 15-16), and the other sample syllabi in this section (pp. 79-92).

Topics and Readings

1. *Psychology of Perception*

- * Fodor, J. and Pylyshyn, Z. "How Direct is Visual Perception?: Some Reflections on Gibson's 'Ecological Approach'." *Cognition* 9 (1981), 139-96.

Gibson, J. J. "The Theory of Affordance." *The Ecological Approach to Visual Perception*. Boston: Houghton Mifflin, 1979.

Gibson, J. J. "A Theory of Direct Visual Perception." In Royce, J. R. and Rozeboom, W. (eds.), *The Psychology of Knowing*. New York: Gordon and Breach, 1972, 215-27.

Hoffman and Richards, "Parts of Recognition." In Pinker.

Kosslyn, Brunn, Cave, and Wallach. "Individual Differences in Mental Imagery Ability: A Computational Analysis." In Pinker.

- * Marr, D. and Nishihara, H. "Visual Information Processing." *Technology Review*, 1978.

Pinker, S. "Visual Cognition: An Introduction." In Pinker, S. (ed.), *Visual Cognition*. Cambridge, Mass.: MIT Press, 1985. Hereafter cited as 'Pinker'.

Pylyshyn, Z. "The Imagery Debate: Analog Media vs Tacit Knowledge." *Psychology Review* 87 (1981), 16-45.

Turvey et. al., "Ecological Laws of Perceiving and Acting: In Reply to Fodor and Pylyshyn." *Cognition* 9 (1981), 237-304.

Ullman, S. "Visual Routines." In Pinker.

II. *Philosophical Theories of Perception and Sensation*

Aristotle. *De Anima*, Book II, and *De Sensu*.

Austin, J. L. *Sense and Sensibilia*. Oxford: Oxford University Press, 1962.

- * Berkeley. *Essay Towards a New Theory of Vision*.

Campbell, K. "Colors." In Brown, R. and Rollins, C. D. (eds.), *Contemporary Philosophy in Australia*. London: Allen and Unwin, 1969, 132-57.

- * Churchland, Paul. "Reduction, Qualia and the Direct Introspection of Brain States." *Journal of Philosophy* 82 (1985).

Dennett, D. "Quining Qualia." *The Intentional Stance*. Cambridge, Mass.: MIT Press, forthcoming. Also Tufts University Center for Cognitive Studies, report #CCM-85-3, Nov. 1985.

Descartes. *Dioptrics*.

- * Dretske, F. *Knowledge and the Flow of Information*. Cambridge, Mass.: MIT Press, 1981. See especially chapter 6.
- * Dretske, F. *Seeing and Knowing*. Chicago: University of Chicago Press, 1969. See especially chapters 1-3.

Grice, H. P. "The Causal Theory of Perception." *Aristotelian Society Proceedings, Supplementary Volume 35* (1961), 121-52.

- * Jackson, F. "Epiphenomenal Qualia." *Philosophical Quarterly* 32 (1982), 27-36.

Jackson, F. *Perception*. Cambridge: Cambridge University Press, 1977.

Jackson, F. "What Mary Didn't Know." *Journal of Philosophy* 83 (1986). Reply to Churchland.

McGinn, C. *The Subjective View: Secondary Qualities and Indexical Thoughts*. Oxford: Oxford University Press, 1983.

Perkins, M. *Sensing the World*. Indianapolis: Hackett Publishing Company, 1983. See especially chapters 4 and 8.

Plato. *Theaetetus*.

Price, H. H. *Perception*. London: Methuen, 1932.

Sosa, E. "Experience and Intentionality." *Philosophical Topics* 14, 1 (1986).

Shoemaker, S. "Phenomenal Similarity." *Critica* 20.

Stroll, A. "Seeing Surfaces." In French et. al. (eds.), *Midwest Studies in Philosophy* vol. X. Minneapolis: University of Minnesota Press, 1986.

- * Tye, M. "The Adverbial Approach to Visual Experience." *Philosophical Review* 93, 2 (1984).

III. *Perceptual Belief*

- * Dennett, D. "Intentional Systems." In his *Brainstorms*. Cambridge, Mass.: MIT Press, 1978.

Dretske, F. "Misrepresentation." In Bogdan, R. (ed.), *Belief*. Oxford: Oxford University Press, 1985.

- * Field, H. "Mental Representation." *Erkenntnis* 13, 2 (1978), 9-61.
- * Fodor, J. "Semantics Wisconsin Style." *Synthese* 57, 3 (1984).

Haugeland, J. *Artificial Intelligence: The Very Idea*. Cambridge, Mass.: MIT Press, 1985. See especially chapter 1, "The Saga of the Modern Mind."

- * Hintikka, J. "On the Logic of Perception." In *Models for Modalities*. Dordrecht: Reidel, 1969, 151-83.

Lewis, D. "Attitudes De Dicto and De Se." In his *Philosophical Papers*, Vol. 1.

Lycan, W. "Form, Function, and Feel." *Journal of Philosophy* 78, 1 (1981), 24-50.

Stalnaker, R. *Inquiry*. Cambridge, Mass.: MIT Press, 1984. See especially chapters 1-4.

Stampe, D. "Toward a Causal Theory of Linguistic Representation." *Midwest Studies in Philosophy: Volume 2*. Minneapolis: University of Minnesota Press, 1979.

IV. *Perceptual Knowledge*

- * Campbell, D. "Pattern Matching as an Essential in Distal Knowing." In Hilary Kornblith (ed.), *Naturalizing Epistemology*. Cambridge, Mass.: MIT Press, 1985.

Carnap, R. "Testability and Meaning." *Philosophy of Science* 3 and 4, 1936-37, 420-71 and 2-40.

Chisholm, R. "The Directly Evident." In Pappas, G. (ed.), *Justification and Knowledge*. Dordrecht: Reidel, 1979, 115-27.

- * Chisholm, R. "The Problem of the Criterion." In *Foundations of Knowing*. Minneapolis: University of Minnesota Press, 1982.
- * Chisholm, R. "Transcendental Evidence and Perception." In his *The First Person*. Minneapolis: University of Minnesota Press, 1981, 92-106.

Churchland, Paul. *Scientific Realism and the Plasticity of Mind*. Cambridge: Cambridge University Press, 1982. See especially chapters 2 and 5.

Cornman, J. *Perception, Common Sense, and Science*. New Haven, Conn: Yale University Press, 1975.

Doppelt, G. "Dretske's Conception of Perception and Knowledge." *Philosophy of Science* 40 (1973), 433-46.

- * Dretske, F. *Knowledge and the Flow of Information*. Cambridge, Mass.: MIT Press, 1981. See especially chapters 4 and 5.
- * Fodor, J. *The Modularity of Mind*. Cambridge: MIT Press, 1983. See especially parts 2 and 3.

Fodor, J. "Observation Reconsidered." *Philosophy of Science* 51 (1984), 23-43.

- * Goldman, A. I. "Discrimination and Perceptual Knowledge." In Pappas, G. and Swain, M. (eds.). *Essays on Knowledge and Justification*. Ithaca: Cornell University Press, 1978, 120-45.

Goldman, A. I. *Epistemology and Cognition*. Cambridge, Mass.: Harvard University Press, 1986. See especially chapter 9.

Goodman, N. "The Way the World Is." *Review of Metaphysics* 14 (1960), 48-56.

Goodman, N. *Ways of Worldmaking*. Indianapolis: Hackett Publishing Co., 1974.

Harrison, B. *Form and Content*. Oxford: Basil Blackwell, 1973. See especially chapters 3 and 4.

- * Lycan, W. "Epistemic Value." *Synthese* 64, 2 (1985), 137-64.

Pollock, J. *Knowledge and Justification*. Princeton: Princeton University Press, 1974. See especially chapters 3-5.

- * Quine, W. V. "Epistemology Naturalized." In his *Ontological Relativity and Other Essays*. New York: Columbia University Press, 1969, 69-90.

Quine, W. V. "Grades of Theoreticity." In Foster, L. and Swanson, J. W. (eds.), *Experience and Theory*. Amherst: University of Massachusetts Press, 1970, 1-17.

Epistemology and the Philosophy of Science: Changes in the Empiricist Concept of Justification

CONTRIBUTORS: Brad Armendt, Drew Christie, Stephen Leeds, Keith Lehrer, Bonnie Paller, Paul Roth.

The purpose of the course outlined below is to trace certain fundamental changes in the notion of justification in this century. Charting the changing relation between epistemology and the philosophy of science illuminates the connection between the sort of problems which troubled epistemologists at least through the 1950's and the seemingly disparate epistemological concerns represented by the Gettier problems, i.e., by the sort of problems about justification which have preoccupied many philosophers since the publication of "Is Justified True Belief Knowledge?". The question of why the Gettier problem is important is seldom discussed. [For examples of very different evaluations of this problem, see Robert Shope, *The Analysis of Knowing: A Decade of Research* (Princeton, N. J.: Princeton University Press, 1983), chapter 1 ("The Significance of the Gettier Problem for an Analysis of Knowing"), and Michael Williams, *Groundless Belief* (New Haven, Conn.: Yale University Press, 1977), pages 5-6].

What explains the close relation between epistemology and the philosophy of science in the first half of the twentieth century, and what accounts for the subsequent split? To answer this question, we must look at the changing relations between the justification of knowledge claims and the confirmation of scientific hypotheses. For once the entire structure of scientific reasoning begins to appear problematic (and not just the justification of theoretical entities), Gettier problems raise the question of how knowledge is possible in even the most mundane sort of cases.

The close connection between epistemology and the philosophy of science, in the general positivist view, was a function of the fact that the natural sciences provided the clearest cases of human knowledge. It was the philosophical task to explain the logical form and evidential basis of this knowledge. What Quine calls first philosophy is just this attempt to underwrite the legitimacy of the natural sciences by appeal to extra-scientific methods. The inability of positivism to provide this philosophical under-

pinning for science left a void with regard to the criteria of what to count as knowledge and justification. We propose a course that considers whether some form of fallibilistic justification (based, for example, on reliability, coherence, or consensus) can fill the void.

This course has its origins in an attempt by some members of the 1986 Summer Institute on the Theory of Knowledge to explain two very different views on the epistemological agenda which were held by Institute participants. One group took the primary purpose of contemporary epistemology to be to respond, via formulation of the appropriate necessary and sufficient conditions, to the challenge set by Gettier and post-Gettier problems for the analysis of knowledge and justification. Others perceived the central epistemological task to have been set by the collapse of positivism in the face of holistic and fallibilistic criticisms. On this view, the problem is whether there exists some neutral framework for the evaluation of knowledge claims. Thus, for the former group, the notion of knowledge is assumed to be unproblematic; what is at issue is its proper analysis. For the latter group, however, what is problematic is precisely whether there is some notion of knowledge to be analyzed.

We suggest that fallibilism provides the basis for a course reconnecting epistemology and philosophy of science. Fallibilism is the doctrine that our most evident and best justified empirical beliefs may be false, and it sets a problem with respect to establishing the relation between justification and knowledge. The positivist's confidence in unproblematic starting points--basic beliefs whose truth is somehow guaranteed, for example--is undercut by the acceptance of fallibilism. The epistemological assumption that justified basic beliefs yield truth, and, therefore knowledge, must be abandoned. The rejection of this assumption creates, at the same time, the epistemological problem noted by Gettier, namely, that even justified true belief falls short of knowledge since justified true belief may be inferred from a justified false belief. Fallibilism leaves us with the problem of showing how fallibilistic justificatory practices can secure knowledge and, more specifically, scientific knowledge.

The proposed course should not be thought of as primarily historical; it is, rather, meant to establish how, within the discipline of philosophy as presently constituted, the notion of justification might be explicated. As the course outline indicates, how the account of justification (and knowledge) is further developed will be at least a partial function of one's assessment of holism and fallibilism. Quine proposes to naturalize epistemology because he despairs of finding a reductive analysis of empirical knowledge. Those who pursue a more traditional analysis of knowledge can also seek a naturalistic account in which justification is based, as Goldman and Lehrer for example have proposed, on probability or reliability. Naturalized epistemology may, therefore, be adapted to the ends of those who seek an analysis of knowledge. The remaining question is whether the resulting analyses intended, in part, to solve the Gettier problem, also may be applied to solve the problem of explicating the basis of scientific knowledge.

The syllabus first prescribes readings which offer a characterization of some of the central epistemological theses of positivism; the next two sections suggest readings which chart the collapse of the positivist program and its ramifications for epistemology and the development of science. One further consequence of this development, discussed below, is that the rationality of both the epistemological and the scientific enterprises is challenged. The last section offers readings which indicate the role of the Gettier problem within the context of the developing divorce between confirmation in science and justification in epistemology. Topics in this section include discussions of naturalized epistemology, the consequences of holism for epistemology and philosophy of science, and various attempts to formulate alternatives to the holist view which grew up in response to disillusionment with positivism.

We have starred (*) readings which we consider to be central to the discussions of these issues; the bracketed numbers following some of the citations offer our assessments of the difficulty involved: [1 = easy; 2 = moderate; 3 = difficult].

Cross References

For additional materials on the project of naturalizing epistemology, see also "Naturalistic Epistemology" in the "Contemporary Sources" section (pp. 23-25).

For a discussion of the role of the Gettier problem in recent epistemology, see also "The Traditional Analysis of Knowledge" (pp. 2-3) and "The Gettier Problem" (pp. 4-7) in the "Contemporary Sources" section.

For a course that considers some of the challenges to positivist science discussed in this module, see "Knowledge, Rationality and Science" in "The First Course" section (pp. 58-65).

Readings

I. *Logical Positivism: Some main doctrines*

Ayer, A. J. *Logical Positivism*. New York: Free Press, 1959. This book contains an outstanding bibliography of the writings central to logical positivism; hereafter cited as 'Ayer'.

Ayer, A. J. *Language, Truth and Logic*. [1] A classic statement of positivist epistemology.

- * Carnap, R. "The Elimination of Metaphysics through Logical Analysis of Language." In Ayer. [1]

Carnap, R. "The Methodological Character of Theoretical Concepts." *Minnesota Studies in the Philosophy of Science: Volume I*.

Carnap, R. "Empiricism, Semantics, and Ontology." In Morick, H. (ed.), *Challenges to Empiricism*, Indianapolis: Hackett, 1980. [3] This book contains a useful annotated bibliography. However, the bibliography is from the original (1972) edition, and so it does not contain more recent discussions. Hereafter cited as 'Morick'.

Carnap, R. "Testability and Meaning." In Feigl and Brodbeck (eds.), *Readings in the Philosophy of Science*. New York: Appleton-Century-Crofts, 1953. 47-92.

Schlick, "The Turning Point in Philosophy." In Ayer.

II. *The Collapse of the Positivist program*

Feyerabend, P. *Against Method: Outline of an Anarchistic Theory of Knowledge*. London: New Left Books, 1975.

- * Hempel, C. "Problems and Changes in the Empiricist Criterion of Meaning." Reprinted in many places, including Ayer, *op. cit.*, and Hempel, C., *Aspects of Scientific Explanation*.
- * Hesse, M. "Duhem, Quine, and a New Empiricism." In Morick. [1]
- * Kuhn, T. S. "Incommensurability and Paradigms." In Morick. [2]
- * Quine, W. V. "Two Dogmas of Empiricism." In Morick. [2]

Sellars, W. "Empiricism and the Philosophy of Mind." (excerpt) In Morick. [2]

Wittgenstein, L. excerpts from either *On Certainty*, and/or *The Blue and the Brown Books*.

III. *Implications for the Philosophy of Science: The Rise of Fallibilistic Holism in the Philosophy of Science*

A. The Emergence of Fallibilism

- * Popper, K. *Conjectures and Refutations*. London: Routledge & Kegan Paul, 1963. Excerpted in Morick. [2]

- * Popper, K. *Logic of Scientific Discovery*. London: Hutchinson, 1968. [2]

Popper, K. *Objective Knowledge*. London: Oxford University Press, 1972. [2]

- * Newton-Smith, W. H. "The Underdetermination of Theory by Data." *Aristotelian Society Supplementary Volume LII*. 1978, 71-91 [2]

B. The Emergence of Holism

- * Hanson, N. R. *Patterns of Discovery*, especially Chapters 1, 2, and 3. [3]

- * Kuhn, T. S. *The Structure of Scientific Revolutions*. Chicago: University of Chicago Press, 1962. [1]

Quine, W. V. "Speaking of Objects." In *Ontological Relativity and Other Essays*. New York: Columbia University Press, 1969. [2]

Quine, W. V. "On Empirically Equivalent Systems of the World." *Erkenntnis* 9 (1975), 313-28. [3]

IV. *Gettier Problems and Fallibilistic Justification*

Readings from the first three sections should show how the inability to establish a first philosophy of the sort longed for by the positivists leads to the progressive estrangement of epistemology and the philosophy of science. The beginnings of the challenge to science as a paradigmatically rational enterprise is also seen in these developments. Quine's now classic paper, "Epistemology Naturalized," is not so much a discussion of how to embed epistemology in empirical psychology but rather, provides Quine's own idiosyncratic overview of the development of empiricism from Hume to Quine. The failure of empiricism is, on this account, its failure to forge the desired link between observations and theoretical entities. It is Harman's survey of the state of affairs in epistemology which provides a sufficiently broad perspective to see phenomenalism, behaviorism, problems concerning induction, and Gettier problems as variations on the general theme of how to articulate an account of knowledge based on fallibilistic reasoning.

Gettier, E. "Is Justified True Belief Knowledge?" *Analysis* 23, 121-23.

Harman, G. *Thought*. Princeton, N. J.: Princeton University Press, 1973. See especially chapter 1. [2] Chapter 1 was

published independently as a survey article on epistemology. See "Epistemology," in E. C. Carterette and M. P. Friedman (eds.), *Handbook of Perception: Volume I. Historical and Philosophical Roots of Perception*. New York: Academic Press, 1974. Harman's discussion makes clear that what links various epistemological concerns through Gettier is the attempt to cash out the justificatory basis for varying types of knowledge claims.

- * Quine, W. V. "Epistemology Naturalized." Originally printed in *Ontological Relativity and Other Essays*. New York: Columbia University Press, 1969. Reprinted in H. Kornblith (ed.), *Naturalizing Epistemology*. Cambridge, Mass.: Bradford/MIT, 1985. [2] The Kornblith anthology also contains an excellent bibliography on the naturalized epistemology literature.

V. *Pragmatic Holism*

This response to fallibilistic holism stresses that there can be no rules for rational belief acceptance.

- * Rorty, R. *Philosophy and the Mirror of Nature*. Princeton: Princeton University Press, 1980. [2]

Social Constructivism:

- * Collins, H. "Son of Seven Sexes." *Social Studies of Science II* (1981), 33-62. [2]

Collins, H. "Stages in the Empirical Programme of Relativism." *Social Studies of Science II* (1981), 3-10. [2]

Knorr-Cetina, K. *The Manufacture of Knowledge*. Oxford: Pergamon Press, 1981. [2]

VI. *Escape from Holism: Causal Theories, Reliabilism and Bootstrapping*

Proponents of this position claim that the only way to save rational belief acceptance is to reject holism.

Glymour, C. *Theory and Evidence*. Princeton: Princeton University Press, 1980.

- * Glymour, C. "On Testing and Evidence." In J. Earman (ed.), *Testing Scientific Theories*. Minneapolis: University of Minnesota Press, 1983. [3]

VII. *Rational Holism*

Rational theory choice and belief acceptance are possible despite fallibilistic holism.

Boyd, R. "Realism, Underdetermination and Causal Theory of Evidence." *Nous* 7 (1973), 1-12. [3]

Boyd, R. "On the Current Status of the Issue of Scientific Realism." *Erkenntnis* 17 (1983), 135-69. [3]

- * Boyd, R. "Lex Orandi Est Lex Credendi." In Churchland and Hooker (eds). *Images of Science*. Chicago: University of Chicago Press, 1985, 3-34. [3]

- * Churchland, Paul. *Scientific Realism and the Plasticity of Mind*. Cambridge: Cambridge University Press, 1979. [3]

Lehrer, K. "Social Information." *The Monist* 60 (1977), 473-87.

VIII. *Embracing Holism*

A number of philosophers have welcomed what they see as the liberating, broadening effect of the fall of positivism and the subsequent rise of holism. So-called "scientism," characterized as the tendency to take mathematical physics as the paradigmatic model of rationality against which all other approaches are measured, is decried as bad science and poor epistemology. Analogies, not differences, between on the one hand the "hard" sciences and on the other hand the social sciences, literary theory, philosophy, etc., are emphasized. Important issues for philosophers who embrace holism and Quine's rejection of the dogmas of empiricism include: How is one to answer the inevitable charge of relativism? How is one to preserve the emancipatory power of critical reflection while rejecting efforts of formulate value-free, neutral, and universal standards of rationality?

- * Rajchman, J. and West, C. (eds.). *Post-Analytic Philosophy*. Columbia University Press, 1985. [2] Contains relevant essays by many key figures in the debate, such as Kuhn, Rorty, Putnam, Bernstein and Hacking.

Hollis, M. and Lukes, S. (eds.). *Reason and Rationality*. Oxford: Basil Blackwell, 1982. [2]

Feminist epistemologists are exploring in depth a detailed critique of scientism. One area of investigation focuses on the points of similarity and dissimilarity between feminist critiques of positivism and neo-positivism and

those made by Rorty, Kuhn, Quine, etc. Sandra Harding, whose early work examined Quine and Duhem, is particularly illuminating in relating the critique of the "dogmas of empiricism" to feminist concerns.

- * Harding, S. *The Science Question in Feminism*. Ithaca: Cornell University Press, 1986. [2]
- * Harding, S. and Hintikka, M. (eds.). *Discovering Reality: Feminist Perspectives on Epistemology, Metaphysics, Methodology, and Philosophy of Science*. Dordrecht: Reidel, 1983. [1]

Jaggar, A. *Feminist Politics and Human Nature*. Sussex: The Harvester Press, 1983. See especially chapter 11, "Feminist Epistemologies". [2]

Books which explicitly wrestle with the epistemological and cultural significance of accepting holism include:

- Putnam, H. *Reason, Truth and History*. Cambridge: Cambridge University Press, 1981. [1]
- + Rorty, R. *Philosophy and the Mirror of Nature*. Princeton: Princeton University Press, 1979. [2]
- * Rorty, R. *Consequences of Pragmatism*. Minneapolis: University of Minnesota Press, 1982. [1]
- Habermas, J. *Knowledge and Human Interests*. Boston: Beacon Press, 1971. [3]
- Bernstein, R. *Beyond Objectivism and Relativism*. Philadelphia: University of Pennsylvania Press, 1983. [1]

Cross Reference

For an example of a course that develops some of the themes discussed in this module, see also "Knowledge, Rationality and Science" in "The First Course" section (pp. 58-65).

Probability and Induction

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Some philosophers have affirmed that induction and probable reasoning lead to knowledge. Others have been skeptical. Some philosophers have thought that probability was an ingredient in the traditional analysis of knowledge. Others have thought that a theory of probability should replace traditional epistemology. It is clear, however, that an understanding of induction, probability, and confirmation are essential for a resolution of these issues as well as others pertaining to epistemology. It is the intention of this module to provide the materials for study that would yield understanding of the relevant issues.

Divisions in the module:

1. Introduction to probability and induction (p. 102).
2. Hume's problem (p. 102).
 - a. Historical treatment of Hume's argument.
 - b. Responses to the problem(s) Hume has been perceived as raising.
3. Goodman's new riddle of induction (p. 104).
4. The origins of the modern concept and theory of probability (p. 107).
5. Philosophical interpretations of the concepts of probability (p. 108).
 - a. Logical
 - b. Relative frequency
 - c. Subjective
 - d. Objective chance
 - e. Epistemic probability.
6. The Bayesian/subjectivist program (p. 113).
 - a. Decision-theoretic roots: coherence, Dutch books, rational preference, probabilism vs. acceptance.
 - b. Belief revision/learning from experience.
7. Theory of confirmation (p. 118).

Most sections include a brief discussion of the issues as well as a list of references for that topic. Starred members [*] of the list are more central to the topic, or are good introductions to it; unstarred members are usually more specialized and often more difficult than the starred entries. We have made an effort to provide suggestions that represent a variety of approaches, but the recommendations that follow are unavoidably biased in accordance with our interests and knowledge.

Anthologies and collections of papers. The following books are cited by references in the sections that follow. Some are collections of papers that are of general interest, and some are more specialized.

Carnap, R. and Jeffrey, R. (eds.). *Studies in Inductive Logic and Probability*. Vol. I, University of California Press, 1971.

Foster, M. and Martin, M. (eds.). *Probability, Confirmation, and Simplicity*. Odyssey Press, 1966.

Harper, W. and Hooker, C. *Foundations of Probability Theory, Statistical Inference, and Statistical Theories of Science*. Vol. 3., Dordrecht: Reidel, 1976.

Hintikka, J. and Suppes, P. *Aspects of Inductive Logic*. North-Holland, 1966.

Jeffrey, R. *Studies in Inductive Logic and Probability*. Vol. II, University of California Press, 1980.

Kyburg, H. and Nagel, E. *Induction: Some Current Issues*. Wesleyan University Press, 1963.

Kyburg, H. and Smokler, H. (eds.). *Studies in Subjective Probability*. Wiley, 1964.

Lakatos, I. *The Problem of Inductive Logic*. North-Holland, 1968.

Luckenbach, S. (ed.). *Probabilities, Problems, and Paradoxes*. Dickenson, 1972.

Schilpp, P. A. *The Philosophy of Rudolf Carnap*. Open Court, 1963.

Swain, M. (ed.). *Induction, Acceptance, and Rational Belief*. North-Holland, 1970.

Mathematical books: These are all fairly demanding; vol. I of Feller is the most accessible.

Billingsley, P. *Probability and Measure*. Wiley, 1979.

Feller, W. *An Introduction to Probability Theory and its Applications*. Wiley, Vol. I (3rd ed.) 1968; Vol. II (2nd ed.) 1971.

Fine, T. *Theories of Probability*. Academic Press, 1973.

Kolmogorov, A. N. *Foundations of the Theory of Probability*. Chelsea, 1950, (2nd ed.) 1956.

1. *Introduction to Probability and Induction*. Three books stand out as philosophical introductions to induction and probability:

1. Skyrms, B. *Choice and Chance*. (3rd ed.). Wadsworth, 1986.
This book contains a general introduction to induction and inductive logic, a chapter that introduces the elementary probability calculus (ch. 5), and treatments of topics 2B, 3, 5, 6, and 7. The treatments of topics 2B, 3, and 6 are particularly thorough; topic 7 is represented by a chapter on Mill's methods; topic 5 is covered, though not in as much detail as in Salmon (1966). Some sections are more difficult, but most of the book is quite accessible to students with little background in philosophy. Substantial parts of the book do presuppose some acquaintance with propositional logic.
2. Salmon, W. *The Foundations of Scientific Inference*. University of Pittsburgh Press, 1966. This book complements *Choice and Chance*. It has a more detailed comparison of the various interpretations of probability (topic 5), and it has more on confirmation.
3. Kyburg, H. *Probability and Inductive Logic*. Macmillan, 1970. This book is written at a level less accessible to most students new to the area. It contains extensive discussion of topics 5 and 7, and some discussion of topics 2B and 3.

2. *Hume's Problem of Induction*. David Hume poses his problem concerning induction in several places, including the *Treatise*, Book I, Part III, section 6, and the *Inquiry*, Section IV, Part II. Exactly what argument Hume is giving is a controversial matter; the references in part A are particularly concerned with this issue. Hume has usually been interpreted as offering a very general skeptical argument directed against induction, and many philosophers have replied to Hume's argument so interpreted. A small but influential part of this literature is listed in part B.

2A. Hume's argument and historical treatments of it

- * Hume, David. *A Treatise of Human Nature*.
- * Hume, David. *An Inquiry Concerning Human Understanding*.

Beauchamp, T. and Rosenberg, A. *Hume and the Problem of Causation*. Oxford University Press, 1981.

Smith, N. K. *The Philosophy of David Hume*. Macmillan, 1949.

Stove, D. C. *Probability and Hume's Inductive Skepticism*. Oxford University Press, 1973.

Stroud, B. *Hume*. Routledge & Kegan Paul, 1977.

2B. *Responses to skepticism about induction*. Most of the references below are not very recent. However, they do represent three prominent kinds of response to skepticism about induction: 1) attempts to inductively justify inductive methods (Black), 2) attempts to give pragmatic justifications or vindications of induction (Reichenbach, Salmon), and 3) attempts to dissolve the problem of justifying induction (Edwards, Strawson). Work on the topic has not died out; recent discussions of Hume's problem tend to be fragments of more general works, some of which are listed in sections 5E and 6B. The references below provide a good beginning for the topic.

Black, M. "The Justification of Induction." In *Language and Philosophy*, Cornell University Press, 1949.

Black, M. "Inductive Support of Inductive Rules." In *Problems of Analysis*, Cornell University Press, 1954.

Edwards, P. "Russell's Doubts about Induction." *Mind* 58 (1949), 141-163.

Feigl, H. "De principiis non disputandum...?" In Max Black (ed.), *Philosophical Analysis, a Collection of Essays*, Prentice-Hall, 1963. Also in Luckenbach (1972).

Jeffrey, R. "Probabilism and Induction." *Topoi* 5 (1986), 51-58.

Reichenbach, H. "A Frequentist Theory of Probability and Induction." 1949. In Luckenbach (1972); excerpts from *The Theory of Probability*.

Reichenbach, H. "On the Justification of Induction." In Feigl, H. and Sellars, W. (eds.), *Readings in Philosophical Analysis*, Appleton-Century-Crofts, 1949.

Salmon, W. "On Vindicating Induction." In Kyburg and Nagel (1963). Also in Luckenbach (1972).

- * Skyrms, B. *Choice and Chance*. (3rd ed.). Wadsworth, 1986. The chapter on Hume's problem is good.

Strawson, P. *Introduction to Logical Theory*. 1952, 248-263.

Will, F. "Will the Future Be Like the Past?" *Mind* 56 (1947), 332-347.

3. *Goodman's New Riddle of Induction*. The obvious starting point is Goodman's *Fact, Fiction, and Forecast* (1955). In chapter 3 Goodman poses the problem; in chapter 4 he offers his own entrenchment theory of projectibility as a solution. There is a good, simple account of this material in Scheffler (1963). An important modification of Goodman's theory of entrenchment (Goodman, Schwartz, and Scheffler 1970) and replies to his critics are reprinted in Goodman (1972). More recent criticisms by Zabłudowski (1974, 1975, 1972, 1982) and replies by Ullian and Goodman (1975, 1976, 1978, 1980, 1982) are listed in the bibliography. (Note: the Zabłudowski saga is complicated and does not lend itself to an elementary presentation).

In reviewing the literature on this topic, it is helpful to bear certain points in mind. (1) As Hesse (1969) points out, Goodman's problem is *new*, and it is about *induction*. Thus, the project is not to justify inductive inferences *per se* (which is the old, Humean problem of induction) but rather to adequately characterize the inductive inferences we do in fact make. In the context of Goodman's paradigm "grue" example, this requires finding a relevant asymmetry between "All emeralds are green" and "All emeralds are grue" that makes the former hypothesis projectible and the latter not. (Or, more realistically, the task is to explain why "bent" hypotheses have much lower degrees of projectibility than "straight" ones). Moreover, since the topic is *inductive* inference, the asymmetry must be *relevant* to our expectation that future emeralds will be green and not grue. Goodman's own position is that the only relevant asymmetries between projectible and unprojectible hypotheses stem from pragmatic and historical differences in the frequency with which their constituent predicates (actually, for Goodman, coextensive classes of predicates) have been (or could have been) projected.

(2) Definitions of "grue" and other bent predicates differ in the literature. These differences can be significant. The most common variations are those which refer to "time-slices" of objects (e.g., "*x* is grue at time *t*") rather than to objects throughout their entire history ("*x* is grue" *simpliciter*), and those which omit the notion of "being examined" which was a feature of Goodman's original definition.

Responses to Goodman's problem can be crudely divided into the following categories. Needless to say, these groupings are neither exclusive nor exhaustive. (1) Goodman's theory of entrenchment is unnecessary since there is relevant *epistemological* asymmetry between "grue" and "green". Often this point is expressed by claiming that unlike "green", "grue" is essentially positional. See Barker and Achinstein (1960), Goodman (1960), Hesse (1969), Swinburne (1973), Shoemaker (1980), Shirley (1981). (2) Goodman's paradox arises only because we mistakenly accept Nicod's criterion as sufficient for inductive support. In fact, it is false that generalizations are always confirmed by their positive, Nicodian, instances. See Cohen

(1970), Rosenkrantz (1982). (3) Goodman's theory of entrenchment fails because of his commitment to radical extensionalism. In particular, radical extensionalism undermines Goodman's conceptions of inherited entrenchment and the role of overhypotheses which play a crucial role in his theory of projectibility. See Bertolet (1976), Teller (1969), Zabłudowski (1974). (4) The solution to Goodman's problem lies in Bayesian confirmation theory, where degrees of projectibility are determined by the prior probabilities of rival hypotheses on background information. See Fain (1967), Teller (1969), Rosenkrantz (1982), Horwich (1982).

Barker, S. F. and Achinstein, P. "On the New Riddle of Induction." *Philosophical Review* 69 (1960), 511-22.

Bertolet, R. J. "On the Merits of Entrenchment." *Analysis* 37 (1976), 29-31.

Cohen, L. J. *The Implications of Induction*. Methuen: London, 1970.

Fain, H. "The Very Thought of Grue." *Philosophical Review* 76 (1967), 61-73.

- * Goodman, N. *Fact, Fiction, and Forecast*. (4th ed.). (1955). Harvard University Press, 1983.
- * Goodman, N. "Positionality and Pictures." *Philosophical Review* 69 (1960), 523-25. Reprinted in Goodman (1972).

Goodman, N. *Problems and Projects*. Indianapolis: Bobbs-Merrill, 1972. See especially chapter 8.

Hesse, M. "Ramifications of 'Grue'." *British Journal of Philosophy of Science* 20, (1969) 13-25.

Horwich, P. *Probability and Evidence*. Cambridge: Cambridge University Press, 1982.

Rosenkrantz, R. D. "Does the Philosophy of Induction Rest on a Mistake?" *Journal of Philosophy* 79 (1982), 78-97.

Scheffler, I. *The Anatomy of Inquiry*. New York: Knopf, 1963.

Shirley, E. S. "An Unnoticed Flaw in Barker and Achinstein's Solution to Goodman's New Riddle of Induction." *Philosophy of Science* 48 (1981), 611-17.

Shoemaker, S. "Properties and Inductive Projectibility." In Cohen, L. J. and Hesse, M. (eds.), *Applications of Inductive Logic*. Oxford: Clarendon Press, 1980, 291-312.

Slote, M. A. "Entrenchment and Validity." *Analysis* 34 (1974), 204-7.

- * Symposium on Goodman's New Riddle of Induction. *Journal of Philosophy* 63 (1966). See especially papers by R. C. Jeffrey, J. J. Thomson, and J. R. Wallace.

Swinburne, R. G. *An Introduction to Confirmation Theory*. London: Methuen, 1973.

- * Teller, P. "Goodman's Theory of Projection." *British Journal of the Philosophy of Science* 20 (1969), 219-38.

Ullian, J. "Wanton Embedding Revised and Secured." *Journal of Philosophy* 77 (1980), 487-95.

Ullian, J. "The Ninth Inning." *Journal of Philosophy* 79 (1982), 332-34.

Ullian, J. and Goodman, N. "Bad Company: A Reply to Mr. Zabłudowski and Others." *Journal of Philosophy* 72 (1975), 142-45.

Ullian, J. and Goodman, N. "Projectibility Unscathed." *Journal of Philosophy* 73 (1976), 527-31.

Ullian, J. and Goodman, N. "The Short of It." *Journal of Philosophy* 75 (1978), 263-64.

Zabłudowski, A. "Concerning a Fiction About How Facts Are Forecast." *Journal of Philosophy* 71 (1974), 97-112.

Zabłudowski, A. "Good or Bad, But Deserved: A Reply to Ullian and Goodman." *Journal of Philosophy* 72 (1975), 779-84.

Zabłudowski, A. "Quod Perit, Perit." *Journal of Philosophy* 74 (1977), 541-52.

Zabłudowski, A. "Revised But Not Secured: A Reply to Ullian." *Journal of Philosophy* 79 (1982), 329-32.

4. *The Origins of Probability*. The best way to begin this topic is with Hacking (1975) and the contrasting views of Garber and Zabell (1979) and Jeffrey (1984). The only really suitable course text is Hacking; most of the other members on the list are primary sources. David (1962) is quite readable and interesting. Todhunter (1865) is a classic work that concentrates on the development of the mathematics.

Arnauld, A. *Logic, or, The Art of Thinking* (The Port-Royal Logic) 1662. Dickoff, J. and James, P. (tr.). Bobbs-Merrill, 1964.

Bayes, T. "An Essay Towards Solving a Problem in the Doctrine of Chances." 1763. In *Two Papers by Bayes*, 1940, 1963, and in Pearson and Kendall, 1970.

Bernoulli, D. "Specimen theorie novae de mensura sortis." 1738. ("Exposition of a new theory of the measurement of risk"). (tr.). In *Econometrica* 22, 23-36, 1954.

Bernoulli, J. *Ars Conjectandi* (*The Art of Conjecturing*). 1713.

- * David, F. N. *Games, Gods, and Gambling*. Charles Griffin, 1962.

De Moivre, A. *The Doctrine of Chances*. 1717, 1738, 1756.

Fermat, Pierre de. "Correspondence with Pascal." See David 1962, 229-253.

- * Garber, D. and Zabell, S. "On the Emergence of Probability." *Archive for History of Exact Sciences*, 21 (1979), 33-53.
- * Hacking, I. *The Emergence of Probability*. Cambridge University Press, 1975.

Huygens, C. *De Ratiociniis in Aleae Ludo* (*On Calculating in Games of Luck*). 1657.

- * Jeffrey, R. "Probability and the Art of Judgment." In Achinstein, P. and Hannaway, O. (eds.), *Experiment and Observation in Modern Science*. Bradford/MIT Press, 1984.

Laplace, P. S. *Theorie Analytique des Probabilités*. 1812, 1814, 1820.

Pascal, B. *Pensées*. 1670. Krailsheimer, A. J. (tr.). Penguin, 1966, also Trotter, F. W. Dutton, 1958.

Pearson, E. S. and Kendall, M. G. *Studies in the History of Statistics and Probability*, 1970.

- * Todhunter, I. *A History of the Mathematical Theory of Probability from the Time of Pascal to that of Laplace*, 1865. Chelsea, 1949.

5. *Interpretations of Probability*. Three major schools of thought about the nature of the inductive probabilities have been influential. On one interpretation, probabilities are (inductive) *logical* relations between propositions, or between some substitutes for propositions. They are knowable *a priori*, at least in principle in the way logical entailment relations are knowable. Another interpretation, or class of interpretations, takes probabilities to be *relative frequencies*. These theories have various forms: probabilities may be interpreted as actual relative frequencies of occurrent events, or as limiting relative frequencies of infinite sequences of occurrent and imagined events, or as modal relative frequencies of possible events. The third kind of interpretation regards probabilities as *subjective*; they are degrees of partial belief held by a rational agent. The degrees of belief are thought of as betting quotients--the odds at which an agent in idealized betting situations would be equally inclined to take either side of a bet on the truth of the proposition in question.

Each of these interpretations has been accused by critics of being incoherent, or of being artificial and uninteresting. In addition, each has been criticized as an inadequate account of probability as it is used in everyday discourse, or in science, or in decision making, or in philosophical (e.g., epistemic) theory, and so on. Some who favor only one of the interpretations try to show how the favored interpretation can account for the intuitions which underlie the other interpretations. Others admit the legitimacy, in distinct domains, of more than one of the interpretations, and they discuss the connections between the kinds of probability.

Besides the three interpretations above, two other kinds of probability are often discussed. One is probability thought of as *objective chance* or propensity. Chances are taken to be out in the world, independent of beliefs about them; they are properties of events or "chance setups". The probabilities of quantum theory are standard examples. They might be subsumed under a relative frequency interpretation (typically not *actual* relative frequencies), but they are often taken to be something else, perhaps basic, especially by those who find limiting or modal relative frequency interpretations unenlightening. Those who do this strive to relate chance to their favored interpretation(s) of probability.

The other kind of probability is *epistemic* probability. This is probability thought of as a measure of degree of justification or warrant. Like subjective probability it is a concept of probability tied to belief systems of a rational agent, but it is not typically developed in terms of variably strong dispositions to act or choose. The normative standards

imposed on the rational believer's corpus of beliefs have their source in intuitions about justification, and are generally more restrictive than the subjectivist's.

The three books listed in section 1, Skyrms' *Choice and Chance*, Salmon's *Foundations of Scientific Inference*, and Kyburg's *Probability and Inductive Logic*, are the best introductions to the interpretations of probability. They should be kept in mind as references for all of the following subsections.

5A. Logical Interpretation of Probability. The central figure is Rudolf Carnap. The three starred papers provide a good introduction to his views; read the "Two Concepts" paper first and the other two in chronological order. Carnap's late work, posthumously published, is not listed below. It appears in Carnap and Jeffrey (1971) and Jeffrey (1980); see the list of anthologies.

- * Carnap, R. "On Inductive Logic." *Philosophy of Science* 12 (1945), 72-97. Also in Luckenbach (1972) and Foster and Martin (1966).
- * Carnap, R. "The Two Concepts of Probability." *Philosophy and Phenomenological Research*, 1945. Also in *Readings in Philosophical Analysis*, Feigl and Sellars, (eds.), Appleton-Century-Crofts 1949.

Carnap, R. *Logical Foundations of Probability*. 1950.
University of Chicago Press, 2nd ed. 1962.

Carnap, R. *The Continuum of Inductive Methods*. University of Chicago Press, 1960.

- * Carnap, R. "The Aim of Inductive Logic." In Nagel, Suppes, Tarski (eds.), *Logic Methodology, and the Philosophy of Science*. Proceedings of the 1960 International Congress. Stanford, Calif., 1962. Also in Luckenbach (1972).

Carnap, R. "Inductive Logic and Inductive Intuition." In Lakatos, 1968. With comments by and replies to Bunge, Watkins, Bar-Hillel, Popper, and Hintikka.

Carnap, R. "Inductive Logic and Rational Decisions."
Expanded version of "The Aim of Inductive Logic" (1960), in Carnap and Jeffrey (1971).

Carnap, R. "Notes on Probability and Induction." *Synthese* 25 (1973), 269-298; notes from Carnap's course at UCLA, Fall 1955.

- * Hintikka, J. "A Two-Dimensional Continuum of Inductive Methods." 1966. In Hintikka and Suppes (1968).

Hintikka, J. "Carnap and Essler versus Inductive Generalization." *Erkenntnis* 9 (1975), 235-244; reply to Essler's comments in same issue on Hintikka's system in Hintikka (1966).

Jeffrey, R. "Carnap's Inductive Logic," *Synthese* 25 (1973), 299-306.

Keynes, J. M. *A Treatise on Probability*. Macmillan & Co, 1921.

5B. *Relative Frequency Interpretations of Probability*. The central figure here is Hans Reichenbach. Begin with Reichenbach (1933) and Salmon (1966). These selections represent the limiting relative frequency interpretation. For a modal relative frequency interpretation, see van Fraassen (1980).

Jeffrey, R. "Mises Redux." In Butts, R. and Hintikka, J. (eds.), *Basic Problems in Methodology and Linguistics*, Part III. Reidel, 1977.

Kyburg, H. *The Logical Foundations of Statistical Inference*. Dordrecht: Reidel, 1974.

- * Reichenbach, H. "The Logical Foundations of the Theory of Probability." In Feigl and Sellars (eds.), *Readings in Philosophical Analysis*, Appleton-Century-Crofts, Inc. 1949; English trans. of 1933 *Erkenntnis* article. Also in Feigl and Brodbeck (eds.), *Readings in the Philosophy of Science*, Appleton-Century-Crofts, Inc. 1953.
- * Reichenbach, H. *The Theory of Probability*. 1935. University of California Press 1949, repr. 1971.

Reichenbach, H. "Philosophical Foundations of Probability." In *Proceedings of the Berkeley Symposium on Probability and Statistics*, University of California Press, 1943.

Reichenbach, H. "A Frequentist Theory of Probability and Induction." 1949. In Luckenbach 1972; excerpts from *The Theory of Probability*.

Salmon, W. "What Happens in the Long Run?" *Philosophical Review* 74, 1965, 373-78.

- * Salmon, W. *The Foundations of Scientific Inference*. University of Pittsburgh Press, 1966.

van Fraassen, B. *The Scientific Image*. Clarendon Press, 1980.
See chapter 6.

von Mises, R. *Probability, Statistics, and Truth*. Macmillan, 1957.

5C. *Subjective Interpretation of Probability*. The chapters on subjective probability in Skyrms' *Choice and Chance* are especially strong parts of the book. The best single reading on the subject is the very rich paper in which it was invented: Ramsey (1926). The interpretation was developed independently in de Finetti (1937). Savage (1954) and Jeffrey (1965, 1983) are both important, influential books. Savage is quite technical, but also has interesting sections of philosophical discussion. Some chapters of Jeffrey's book are intricate, but they do not require advanced mathematics; the philosophical parts of the book are accessible treatments of diverse topics. The 1983 edition has very useful comments and references at the end of each chapter. There is considerable overlap between the works listed here and those listed in section 6B on Bayesian theory: the list below contains the works that obvious, central references on subjective probability, together with a few others that are somewhat arbitrarily picked. For more references, see section 6.

- * de Finetti, B. "Foresight: Its Logical Laws, Its Subjective Sources." 1937. In Kyburg and Smokler, 1964.

de Finetti, B. *Theory of Probability*. 2 vols. Wiley, 1970.

de Finetti, B. *Probability, Induction, and Statistics*. 1972.

Hacking, I. "Slightly More Realistic Personal Probability." *Philosophy of Science*, 34 (1967), 311-325.

- * Jeffrey, R. *The Logic of Decision*. McGraw Hill, 1965; (2nd ed.). University of Chicago Press, 1983.

Kyburg, H. "Subjective Probability: Criticisms, Reflections, and Problems." *Journal of Philosophical Logic* 7 (1978), 157-180.

Kyburg, H. and Smoker, H. (eds.). *Studies in Subjective Probability*. Wiley, 1964.

- * Ramsey, F. P. "Truth and Probability." 1926. In *The Foundations of Mathematics*, Routledge & Kegan Paul, 1931. Also in Kyburg and Smokler (1964).
- * Savage, L. J. *The Foundations of Statistics*. Wiley, 1954; also 1972, Dover.

Savage, L. J. "Difficulties in the Theory of Personal Probability." *Philosophy of Science* 34 (1967), 305-310.

5D. Chance.

Braithwaite, R. B. "On Unknown Probabilities." In S. Kormer, (ed.), *Observation and Interpretation*. Butterworth's Scientific Publications, 1957.

Fetzer, J. "Dispositional Probabilities." *Boston Studies in the Philosophy of Science* 8 (1971), 473-482. Dordrecht: Reidel.

Giere, R. "A Laplacean Formal Semantics for Single-Case Propensities." *Journal of Philosophical Logic* 5 (1976), 321-353.

Hacking, I. *Logic of Statistical Inference*. Cambridge University Press, 1965.

Jeffrey, R. "Judgmental Probability and Objective Chance." *Erkenntnis* 24 (1986), 5-16.

Kyburg, H. "Chance." *Journal of Philosophical Logic* 5 (1976), 355-393.

Kyburg, H. "Propensities and Probabilities." *British Journal for the Philosophy of Science* 25 (1974), 358-375.

Levi, I. *Gambling with Truth*. Knopf, 1967.

Levi, I. "On Indeterminate Probabilities." *Journal of Philosophy* 71 (1974), 391-418.

Lewis, D. "A Subjectivist's Guide to Objective Chance." In Jeffrey (1980).

- * Mellor, D. H. *The Matter of Chance*. Cambridge University Press, 1971.

Popper, K. "The Propensity Interpretation of Probability."

British Journal for the Philosophy of Science 10 (1959), 25-42.

Skyrms, B. "Resiliency, Propensity, and Causal Necessity." *Journal of Philosophy* 74 (1977), 704-713.

Suppes, P. "New Foundations for Objective Probability: Axioms for Propensities." In Suppes, *et. al.* (eds.), *Logic, Methodology, and Philosophy of Science*, vol. 5. North Holland, 1973.

van Fraassen, B. "A Temporal Framework for Conditionals and Chance." *Philosophical Review* 89 (1980), 91-108.

5E. *Epistemic Probability.*

Bogdan, R. (ed.). *Profile of Kyburg and Levi*. Dordrecht: Reidel, 1981.

Kyburg, H. "Epistemological Probability." *Synthese* 23 (1971), 309-326.

Kyburg, H. *Logical Foundations of Statistical Inference*. Dordrecht: Reidel, 1974.

Pollock, J. *Knowledge and Justification*. Princeton University Press, 1974.

Pollock, J. "Epistemology and Probability." *Synthese* 55 (1983), 231-252.

6A. *Bayesian Decision Making, Coherence, Preference, Acceptance.* Several themes appear in this section. The decision-theoretic roots of Bayesianism are more fully represented here than in section 5C. There are two strands in the literature on this subject: First, the presentation and evaluation of the well-known Dutch book arguments that rational degrees of belief are *coherent*, i.e., satisfy the probability calculus. The idea of the argument is mentioned in Ramsey (1926) without much elaboration; it appears repeatedly in the important Bayesian works, and a number of papers have appeared, some fairly recently, that are specifically devoted to the argument. Dutch book arguments have also appeared in discussions of diachronic rules for *changing* beliefs; references containing them appear in section 6B. The literature mentioned below deals with arguments for coherent synchronic belief systems.

de Finetti, B. "Foresight: Its Logical Laws, Its Subjective Sources." 1937. In Kyburg and Smokler (1964).

- * Eells, E. *Rational Decision and Causality*. Cambridge University Press, 1982.

Heilig, K. "Carnap and de Finetti on Bets and the Probability of Singular Events: the Dutch Book Argument Reconsidered." *British Journal for the Philosophy of Science* 29 (1978), 325-346.

Jackson, F. and Pargetter, R. "A Modified Dutch Book Argument." *Philosophical Studies* 29 (1976), 403-407.

Jeffrey, R. *The Logic of Decision*. McGraw Hill, 1965; (2nd ed.), University of Chicago Press, 1983.

Kemeny, J. G. "Fair Bets and Inductive Probabilities." *Journal of Symbolic Logic* 20 (1955), 263-273.

Kennedy, R. and Chihara, C. "The Dutch Book Argument: Its Logical Flaws, Its Subjective Sources." *Philosophical Studies* 36 (1979), 19-33.

Lehmann, R. S. "On Confirmation and Rational Betting." *Journal of Symbolic Logic* 20 (1955), 251-262.

Ramsey, F. P. "Truth and Probability." In *The Foundations of Mathematics*. Routledge & Kegan Paul, 1931. Also in Kyburg and Smokler (1964).

Savage, L. J. *The Foundations of Statistics*. Wiley, 1954; also 1972, Dover.

Shimony, A. "Coherence and the Axioms of Confirmation." *Journal of Symbolic Logic* 20 (1955), 1-28.

- * Skyrms, B. *Choice and Chance*. (3rd ed.). Wadsworth, 1986.

The second strand in the literature on decision-theoretic roots of Bayesianism consists of treatments of subjective probability (rational degrees of belief) in terms of rational preference systems. In the foundations of Bayesian decision theory the idea is that axiomatically described rational systems of preferences can be shown to be represented (and to an appropriate extent, *uniquely* represented) by utility assignments and probability functions that satisfy an appropriate Bayesian decision rule. Such foundations figure prominently in the classics: Ramsey (1926), Savage (1954), and Jeffrey (1965, 1983). Fishburn (1981) surveys the large number of theories put forward by the time he wrote. An account of the influential approach to the

foundations of decision theory developed by Suppes, Luce, and others can be found in Krantz, *et. al.* (1971). Eells (1982) contains a less technical discussion of the Bayesian foundations. In many ways Jeffrey's theory (which makes use of formal results of Boker--see Jeffrey for references), is philosophically the most satisfactory foundation for subjective probability, but Jeffrey's decision theory has been attacked recently as inappropriate in certain decision situations, and several critics have advanced versions of "causal decision theory" as a substitute. The remaining entries on the list deal with this issue.

Armendt, B. "A Foundation for Causal Decision Theory." *Topoi* 5 (1986), 3-19.

- * Eells, E. *Rational Decision and Causality*. Cambridge University Press, 1982.

Fishburn, P. "Subjective Expected Utility: A Review of Normative Theories." *Theory and Decision* 13 (1981), 139-199. This paper contains a good bibliography of the technical work in this area.

Gibbard, A. and Harper, E. "Counterfactuals and Two Kinds of Expected Utility." In *Ifs*, Harper, Stalnaker, and Pearce (eds.), Dordrecht: Reidel, 1976.

- * Jeffrey, R. *The Logic of Decision*, McGraw Hill, 1965; (2nd ed.), University of Chicago Press, 1983.

Jeffrey, R. "The Logic of Decision Defended." *Synthese*, 48 (1981), 473-492.

Krantz, D., Luce, R. D., Suppes, P., and Tversky, A. *Foundations of Measurement*. Vol. I, Academic Press, 1971.

- * Ramsey, F. P. "Truth and Probability." In *The Foundations of Mathematics*, Routledge & Kegan Paul, 1931. Also in Kyburg and Smokler (1964).

- * Savage, L. J. *The Foundations of Statistics*. Wiley, 1954; also 1972, Dover.

Skyrms, B. *Causal Necessity*. Yale University Press, 1979.

Skyrms, B. *Pragmatics and Empiricism*. Yale University Press, 1984, chapters 2, 4.

The last topic of this section is the question of how the Bayesian notion of partial belief and the normative principles Bayesians endorse are connected to the notion of (rational) *acceptance*. Many Bayesians have reasons for thinking that it is rarely or never rational to give full belief (degree of belief 1) to empirical propositions; many others have reasons for thinking that any epistemology for humans must permit full belief, i.e., acceptance, of empirical propositions without condemning it as irrational. Several views are possible here: 1) the Bayesian's normative standards are incompatible with acceptance, and so much the worse for the Bayesian's standards; 2) they are incompatible, and so much the worse for the notion of rational acceptance; 3) there is some way of resolving the apparent conflict without completely rejecting either notion. The place to begin this topic is with Levi (1970) and Jeffrey's (1970) reply.

- * Jeffrey, R. "Dracula Meets Wolfman: Acceptance vs. Partial Belief." In Swain 1970.

Kaplan, M. "A Bayesian Theory of Rational Acceptance." *Journal of Philosophy* 78 (1980), 305-330.

- * Levi, I. "Probability and Evidence." In Swain, 1970.

Levi, I. *The Enterprise of Knowledge*. MIT Press, 1980.

6B. *Bayesian Learning/Belief Revision*. A central part of the Bayesian program is the treatment of belief revision. All the papers listed below deal with the topic; this has been a very active area in recent years. The best place to begin is chapter 11 of Jeffrey (1965, 1983) for mention of the rule of simple conditionalization (applicable when learning is the acquisition of evidence having probability 1), and an account of Jeffrey's generalization of that rule for uncertain evidence. *Probability kinematics* is a term that sometimes refers to a general picture of how learning may occur, but is more often used to refer specifically to Jeffrey's rule. Another idea is that rational belief revisions are minimal belief revisions given the new evidence; the rule of maximum entropy inference is based on this idea. Some of the papers below explore the connections between conditionalization and maximum entropy inference. Jeffrey's notes at the end of chapter 11 of his book mention most of the papers below. Two important papers that appear after those notes were written are van Fraassen (1984) and Skyrms (1986).

Armendt, B. "Is There a Dutch Book Argument for Probability Kinematics?" *Philosophy of Science* 47 (1980), 583-588.

Diaconis, P. and Zabell, S. "Updating Subjective Probability." *Journal of the American Statistical Association* 77 (1982), 822-830.

Domotor, Z. "Probability Kinematics, Conditionals, and Entropy Principles." *Synthese* 63 (1985), 75-114.

Field, H. "A Note on Jeffrey Conditionalization." *Philosophy of Science* 45 (1978), 361-367.

Freedman, D. and Purves, R. "Bayes' Method for Bookies." *Annals of Mathematical Statistics* 40 (1969), 1177-1186.

Garber, D. "Discussion: Field and Jeffrey Conditionalization." *Philosophy of Science* 47 (1980), 142-145.

Harper, W. "Rational Belief Change, Popper Functions, and Counterfactuals." *Synthese* 30 (1975), 221-262. Also in Harper and Hooker, 1976.

Harper, W. "Ramsey Test Conditionals and Iterated Belief Change." 1976. In Harper and Hooker, 1976.

Harper, W. "Bayesian Learning Models with Revision of Evidence." *Philosophia* 7 (1978), 357-367.

- * Jeffrey, R. *The Logic of Decision*. McGraw Hill, 1965; (2nd ed.), University of Chicago Press, 1983. See especially chapter 11.

Jeffrey, R. "Probable Knowledge." In Lakatos (1968).

Lehrer, K. "Truth, Evidence, and Inference." *American Philosophy Quarterly* (1974), 79-92.

Lehrer, K. "Induction, Rational Acceptance, and Minimally Inconsistent Sets." In Maxwell, G., and Anderson, R. M., Jr., (eds.), (1975) *Minnesota Studies in the Philosophy of Science*. Vol. 4, University of Minnesota Press, 1975, 295-323.

Levi, I. "Probability Kinematics." *Philosophy of Science* 18 (1967), 197-209.

Skyrms, B. *Pragmatics and Empiricism*. Yale University Press, 1984. See especially chapter 3.

Skyrms, B. "Maximum Entropy Inference as a Special Case of Conditionalization." *Synthese* 63 (1985), 55-74.

Skyrms, B. "Dynamic Coherence and Probability Kinematics." 1986. Circulated manuscript.

Teller, P. "Conditionalization and Observation." *Synthese* 26 (1973), 218-258. Also in Harper and Hooker (1976) vol. I.

van Fraassen, B. "Rational Belief and Probability Kinematics." *Philosophy of Science* 47 (1980), 165-178.

van Fraassen, B. "A Problem for Relative Information Minimizers in Probability Kinematics." *British Journal for the Philosophy of Science* 32 (1981), 367-379.

van Fraassen, B. "Belief and the Will." *Journal of Philosophy* 81 (1984), 235-256.

Williams, P. M. "Bayesian Conditionalization and the Principle of Minimum Information." *British Journal for the Philosophy of Science* 31 (1980), 131-144.

7. *Theory of confirmation.* The seminal work in this area is Hempel (1945). There are systematic discussions of Hempel's arguments, with useful bibliographies in Scheffler (1963) and Swinburne (1971, 1973). In teaching this material it is vital to distinguish clearly between two different things that get called "paradoxes of confirmation" in the literature: (1) Hempel's *reductio ad absurdum* of Nicod's Criterion based on the logical inconsistency between Nicod's Criterion (regarded as *necessary* for confirmation), the Scientific Laws Condition, and the Equivalence Condition (if e confirms h , then e confirms any j that is logically equivalent to h). The "Scientific Laws Condition" is Swinburne's term for the claim that H , H_3 , and H_4 are logically equivalent where H = "All ravens are black," H_3 = "Everything which is either a raven or a nonraven is either black or a nonraven," and H_4 = "All nonblack things are nonravens." Nicod's Criterion is the assertion that hypotheses of the form "All X 's are Y 's" are confirmed by observation reports e if and only if e is of the form " Xa & Ya ." (2) The derivation from Hempel's own Satisfaction Criterion of the results that H = "All ravens are black" (which Hempel writes as $(x)(Rx \rightarrow Bx)$, where " \rightarrow " is material implication) is confirmed not only by observation reports of black ravens (b_1 = " Ra & Ba "), but also by reports of black nonravens (b_3 = " $\neg Ra$ & Ba "), and by reports of nonblack nonravens (b_4 = " $\neg Ra$ & $\neg Ba$ "). Hempel himself regards the b_3 and b_4 results as correct (and hence *nonparadoxical*) arguing that our intuitive belief to the contrary is a psychological illusion.

One important class of attempts to vindicate Hempel's judgment that observations of nonravens confirm H comes from adopting what Swinburne calls the "quantitative argument." (Rody (1978) refers to this as "the class-size approach"). The best accounts of this approach are Alexander (1958), Mackie (1963), and Swinburne (1971, 1973). Much of this material can be presented very simply by using Venn diagrams in which areas are proportional to probabilities.

The class-size approach has two main ingredients: (1) the introduction of background knowledge, k , about the ratio of ravens to nonravens (x : $1-x$), and the ratio of black things to nonblack things (y : $1-y$) in the universe; and, (2) a probabilistic theory of confirmation based on what Mackie (1963) calls "the Inverse Principle." (Following Hooker and Stove (1967), Mackie (1969) later refers to this principle as "the Relevance Criterion"). The Inverse Principle states that h is confirmed by an observation report b relative to background knowledge k if and only if $Pr(b/k \& k) > Pr(b/k)$, and that b confirms h the better the more the adding to h to k raises the probability of b .

The clearest motivation for the Inverse Principle comes from adopting what Salmon (1973, 1975), following Carnap, calls the "relevance" or "incremental" concept of confirmation. On this conception, b confirms h on k just in case $Pr(h/b \& k) > Pr(h/k)$. The Inverse Principle then follows from Bayes' Theorem.

The class-size approach vindicates Hempel's judgment about the positive confirming power of b_4 instances but it also contradicts his verdict about b_3 instances. On the one hand, b_4 instances always confirm H , but when $x < (1-y)$ their confirming power is very small and quite negligible compared with that provided by b_1 reports. This would plausibly explain our psychological conviction that b_4 reports are confirmationally neutral since we normally take for granted that the number of nonblack things in the universe vastly exceeds the number of ravens. On the other hand, b_3 reports always disconfirm H whenever $y < 1$ and $x > 0$. Hooker and Stove (1967) and Rody (1978) regard this as a decisive objection to the class-size approach.

As Salmon (1975), Rody (1978), and Rosenkrantz (1982) have noted, the Hempelian concept of confirmation is fundamentally at odds with the Bayesian concept underlying the class-size approach. For example the inverse condition (sometimes called "Huyghens' Principle") that h is always confirmed by its logical consequences is rejected as false by Hempel, but it is an immediate consequence of Bayes' Theorem.

Various proposals have been made within the Bayesian tradition for resolving the b_3 problem and for providing a more convincing account of confirmation in general (Salmon, Good, Horwich, Rosenkrantz, Rody). Rody (1978), for example, defends the Relevance Criterion by adopting a theory of selective confirmation in which b confirms h on k with respect to a competing hypothesis h' , if and only if $Pr(b/h \& k) > Pr(b/h' \& k)$. The general features of theories of selective confirmation and their implications for the Equivalence Condition are discussed in Grandy (1967). (The basic point is that logically equivalent hypotheses do not entail the same contraries and so the Equivalence Condition cannot be retained in its original formulation).

Other attempts to solve the paradoxes of confirmation include Popperian approaches (Watkins 1964) which stress the importance of the method by which observation reports are obtained, and nonformal approaches influenced by Quine's views on natural kinds (Fisch 1984).

Readings

Alexander, H. G. "The Paradoxes of Confirmation." *British Journal of the Philosophy of Science* 9 (1958), 227-33.

Fisch, M. "Hempel's Ravens, The Natural Classification of Hypotheses and the Growth of Knowledge." *Erkenntnis* 21 (1984), 45-62.

Good, I. J. "The Paradox of Confirmation." *British Journal of the Philosophy of Science* 11 (1960), 145-49.

Good, I. J. "The Paradox of Confirmation (II)." *British Journal of the Philosophy of Science* 12 (1961), 63-64.

Grandy, R. E. "Some Comments on Confirmation and Selective Confirmation." *Philosophical Studies* 18 (1967), 19-24.

- * Hempel, C. G. "Studies in the Logic of Confirmation." *Mind* 54 (1945), 1-26, 97-121. Reprinted with a postscript in Hempel, C. G., *Aspects of Scientific Explanation*. New York: The Free Press, 1965, 1-51.

Hooker, C. A. and Stove, D. "Relevance and the Ravens." *British Journal of the Philosophy of Science* 18 (1968), 305-15.

Horwich, P. *Probability and Evidence*. Cambridge: Cambridge University Press, 1982.

Mackie, J. L. "The Relevance Criterion of Confirmation." *British Journal of the Philosophy of Science* 20 (1963), 27-40.

Rody, P. J. "(C) Instances, The Relevance Criterion, and the Paradoxes of Confirmation." *Philosophical Studies* 45 (1978), 289-302.

Rosenkrantz, R. D. "Does the Philosophy of Induction Rest on a Mistake?" *Journal of Philosophy* 79 (1982), 78-97.

Salmon, W. C. "Confirmation." *Scientific American* 228 (1973), 75-83. (May issue)

Salmon, W. C. "Confirmation and Relevance." In G. Maxwell and R. M. Anderson, Jr., (eds.), *Induction, Probability, and*

Confirmation: Minnesota Studies in the Philosophy of Science, vol. 6. Minneapolis: University of Minnesota Press, 1975, 3-36.

Scheffler, I. *The Anatomy of Inquiry*. New York: Knopf, 1963.

Smokler, H. "The Equivalence Condition." *American Philosophical Quarterly* 4 (1967), 300-7.

Swinburne, R. G. "The Paradoxes of Confirmation--A Survey." *American Philosophical Quarterly* 8 (1971), 318-30.

Swinburne, R. G. *An Introduction to Confirmation Theory*. London: Methuen, 1973.

Watkins, J. W. N. "Confirmation, Paradox and Positivism." In M. Bunge (ed.), *The Critical Approach to Science and Philosophy*. New York: The Free Press, 1964.

Language and Knowledge

CONTRIBUTOR: Philip Peterson.

This course examines two claims: (1) that recent results in linguistics and current linguistic theory of generative-transformational grammars support philosophical rationalism, and (2) that current empiricistic views on possessing, acquiring and using natural language are false. The philosophical consequences of linguistic theory will be covered in the writings of Noam Chomsky, with dissenting views from such writers as Putnam, Quine, Goodman, Wells, Goldman, Nagel, and Danto.

Texts

Stich, S. (ed.). *Innate Ideas*. Berkeley: University of California, 1975. Hereafter referred to as 'Stich'.

Fromkin, V. and Rodman, R. *An Introduction to Language*. Holt, Rinehart, Winston.

Chomsky, N. *Language and Mind*. (2nd ed.). Harcourt, Brace, Jovanovich, 1970. Excerpts from chapter 1.

Chomsky, N. *Aspects of the Theory of Syntax*. Cambridge, Mass.: MIT Press, 1965.

Chomsky, N. *Reflections on Language*.

Chomsky, N. *Rules and Representations*. Columbia University Press.

Hook, S. (ed.). *Language and Philosophy*. New York: New York University Press, 1979. This book is presently out of print, so several chapters will have to be duplicated.

Cross Reference

For additional material concerning *a priori* knowledge, see also "A *Priori* Knowledge" in the "Contemporary Sources" section (pp. 64-66) and "A *Priori*/A *Posteriori* Knowledge" in the "Historical Sources" section (pp. 64-66).

Topics and Readings

Part I: A Priori Knowledge and Innate Ideas

Readings: Stuch, chapters 1-3.

Plato's recollection theory to motivate a discussion of *a priori* knowledge and innate ideas; the Locke-Leibniz debate to illustrate rationalism versus empiricism, focused on the issue of innate ideas; selections from Descartes and Locke, to consider innateness from different perspectives.

Part II: Linguistics

Readings: Fromkin and Rodman.

Chomsky, *Language and Mind*, chapters 1 and 2.

The point of this section is to teach students enough linguistics so that they can participate fully in informed discussions of the basic themes of the course. The Fromkin and Rodman book is easy to read, even when considering such technical concepts as phonology, and so is a good text to use for this purpose.

Part III: Chomsky's Philosophical Claims

Readings: Chomsky, *Aspects of the Theory of Syntax*, chapter 1.

The creative aspect of language use; language acquisition and the poverty of the stimulus; the consequent innateness of linguistic universals (formal and substantive); explanation in linguistics.

Part IV: Objection and Replies

Readings: Stuch, the Putnam-Chomsky debate; selections by Goodman, Quine, Wells, Danto, Goldman, Katz, Nagel.

The Putnam-Chomsky debate; Goodman's objections (with Chomsky's replies in *Language and Mind* and elsewhere); Quine's brief objection.

SOME PEDAGOGICAL REMARKS

CONTRIBUTORS: Carolyn Black, James Bogen, Marjorie Clay, Mylan Engel, Jaakko Hintikka, Keith Lehrer, G. J. Matthey, William Morris, Andrew Naylor.

INNOVATIONS

The preceding sections of this booklet focus on content, and represent our best effort at preparing a guide to some of the readings, topics, etc., that might be used to develop a Theory of Knowledge course. With this section, we turn to pedagogy, and offer a variety of ideas about how theory of knowledge might be taught. For example, Jaakko Hintikka suggests a way to use popular fiction to motivate epistemological discussions; Jim Bogen describes an unusual philosophy course where students are encouraged not to read anything except papers produced by the class itself. Other innovations include micro-essays, recitals, thought questions and dialogues. We have also included sample assignments, from paper topics (p. 131) to exam questions (p. 132), and a selection of questions taken from the German edition of Keith Lehrer's *Knowledge* (p. 134).

Division of this unit:

1. Using Popular Fiction (p. 123)
2. Introduction to Philosophical Writing (p. 125)
3. Micro-Essays (p. 127)
4. Miscellaneous Ideas (p. 128).

Using Popular Fiction

CONTRIBUTOR: Jaakko Hintikka.

Instructors looking for interesting ways to motivate discussions of epistemological problems might consider using popular fiction. In an unpublished paper, "But Did Lady Astwell Know It? Popular Fiction as a Source of Epistemological Insights," Jaakko Hintikka reports that the following questions can be uncovered in Agatha Christie's short story, "The Under Dog":

whether knowledge is true belief, and how that definition fails;

whether there is a special internal state of knowing (à la Prichard, in *Knowledge and Perception*);

what counts as evidence, and how much is required to justify a knowledge claim;

whether a knower must always be conscious of his/her grounds for knowledge;

whether knowledge is justified true belief, and how that definition fails; (Hintikka suggests that "The Under Dog" offers a "more vivid and more fully delineated example" which challenges the traditional JTB account of knowledge in much the same way as the famous counter-example produced by Edmund Gettier in 1963);

whether intuition should be considered a source of knowledge;

what the relation is between knowledge and proof, and between the justification and the acquisition of belief; and

what the difference is between ordinary usage and the philosopher's use of 'know'.

According to Hintikka, one of the central issues raised by contemporary fiction is the question of what should be considered the "proper" sense of knowing. Since recent epistemologists claim that their theories and analyses are based upon "intuitions," Hintikka argues, perhaps they should enrich that base by considering the intuitions of non-philosophers. Doing so may produce two salutary effects:

- (1) since the intuitions of non-philosophers are not contaminated by theory or bias, they should yield less suspect grounds for philosophical analysis than the intuitions of epistemologists;
- (2) any epistemological theory that takes these intuitions into account will thereby accord with ordinary usage; a decided pedagogical advantage even if it is a disputed philosophical one.

Hintikka also suggests that the Christie story illustrates another interesting issue: whether the epistemologist's evaluation of evidence should include methods used to select that evidence from the total information potentially available. He has argued elsewhere that the process of activating tacit knowledge is subject to rational evaluation, and further, that in many important respects it is similar to paradigmatic processes of knowledge-seeking.

It is his view that epistemologists have unnecessarily narrowed their focus to problems of justifying knowledge-claims when there is important work to be done in examining methods of knowledge acquisition. His recent work begins that examination, using questioning as a paradigm.

Hintikka, J. "Questioning as a Philosophical Method." In Fetzer, J. H. (ed.), *Principles of Philosophical Reasoning*. Totowa, N. J.: Rowman & Allenheld, 1984, 25-43.

Hintikka, J. "The Logic of Science as a Model-Oriented Logic." In Asquith, P. and Kitcher, P. (eds.), *PSA 1984*. East Lansing: Philosophy of Science Association, 1984, 177-85.

Hintikka, J. "A Spectrum of Logics of Questioning." *Philosophica* 35 (1985), 135-50.

Hintikka, J. "On the Logic of an Interrogative Model of Scientific Inquiry." *Synthese* 48 (1981), 69-83.

Hintikka, J. and Hintikka, Merrill B. "Sherlock Holmes Confronts Modern Logic: Towards A Theory of Information-Seeking Through Questioning." In Barth, E. M. and Martens J. L. (eds.), *Argumentation: Approaches to Theory Formation*, Amsterdam: Benjamins, 1982, 55-76.

Introduction to Philosophical Writing

CONTRIBUTOR: James Bogen.

This is a version of an introductory course called "Introduction to Philosophical Writing," which I've taught once a year at Pitzer College for the last five years. For reasons I don't understand, it works well, and prepares students to take intermediate courses.

The course is limited to no more than 15 students, and should be taken only by students who have had no previous exposure to philosophy. It is suitable for freshmen as well as upperclassmen.

Format. After an introductory lecture on what philosophers do, students are asked to prepare a list of questions, one of which will be selected for the course. Once a question has been selected, the rest of the term will be spent trying to find an answer to it. The submitted questions are discussed during the next two meetings of the course, at the end of which time the class votes to select the one they will work on for the remainder of the course. Students should be instructed to think of questions having to do with knowledge. In discussing candidates, they should think about how they would go about answering them. Although impossible topics should be ruled out (e.g., questions involving empirical work in psychology which the class couldn't

carry out), it is important to let students select the question as freely as possible.

After a topic is selected, the class should decide how to begin working on it, and they also should select a topic for a short paper (2 to 4 pages) to be written for the next meeting. From this point onward, each student writes a short paper each week. The papers are duplicated and circulated so that they can be read before the meeting at which they will be discussed. Most course meetings consist of one or more students reading his/her paper aloud, and a discussion of the papers. The topic for the next paper should emerge out of these discussions. Where needed, I give short lectures on methodology, and sometimes, on developments from the discussions, but most of the class meetings should be devoted to carefully refereed discussion. At the end of the term, each student writes a term paper on a topic of his/her choice having to do with what was discussed during the term. When I have the energy, I give 45-minute oral exams on the papers. They are conducted much like a tutorial session.

During the term, students do not read anything except the papers produced by the class. Usually, they will want to read some of the literature on the issues which emerge during the class to see how what they did compares with treatments by professional philosophers. This "outside" reading can be done during the last week of the course; in some cases, it is useful to give students something to read in connection with their term papers.

My experience has been that students who do reasonably well in the course have no trouble at all with reading philosophy in the courses they take next. They tend to be better at discussing philosophy than students from normal introductory courses. And without exception, the courses have produced interesting and intellectually rigorous work.

Some pitfalls to avoid. Great care must be taken to make it clear to students that argument is essential, that objections are to be expected, and that they are to be understood as directed against a position, and not against the person who defends it. This is ticklish and delicate work. It is essential to avoid ego damage without discouraging vigorous argument.

It is also essential to avoid imposing your own views on the class. As much as possible, I try to limit my remarks to correcting methodological errors, asking questions to draw out issues implicit in the discussion, and, when needed, summarizing the results of complicated and extended discussions.

Most beginners don't have the stamina to follow a sustained discussion for more than about 15 minutes. That means that in the early meetings, it is a good idea to stop occasionally, summarize what has been said, and let students recover for a few minutes before continuing. It helps to have coffee on hand. And it is best not to have overly long meetings: an hour and a half twice a week seems to work, if they are carefully paced.

Micro-Essays

CONTRIBUTOR: William Morris.

While some of the students at the University of Cincinnati would be academic successes anywhere, the average student has a tough time, particularly with philosophy courses. They are often bewildered by the abstract nature of philosophy, by the critical abilities which philosophy requires (which they know they don't have), and by the nebulous instructions they usually receive about philosophy course requirements ("write three short critical papers," "do a term paper to be handed in at the end of the term," etc.).

One of the devices I use in my courses to teach students how to do philosophy is the "Micro-Essay." I assign five micro-essays during the quarter, for a total of 50% of the course grade. When I return micro-essays, I always do one myself. The following directions are given to the students:

1. A micro-essay is a summary of a reading assignment. It should contain both the main points or conclusions of the reading and the main features of the author's arguments for those conclusions. In philosophy, one of our primary interests is in evaluating arguments. A well-constructed micro-essay shows that you've done the necessary preliminary work for such an evaluation: it shows that you've understood the structure of the author's central arguments, that you've internalized that structure and are able to express it in your own words.
2. Micro-essays are also exercises in clarity and economy of expression. They should be written on one 8x5 index card. Typing is encouraged, but it is not required. Handwritten micro-essays must be legible or they will not be accepted.
3. Each micro-essay summarizes one reading assignment, the assignment indicated on the syllabus to be discussed on the day that the micro-essay is due. Each micro-essay is to be handed in at the beginning of class on the appropriate day. Essays may be handed in early, but late micro-essays will not be accepted. There will be no exceptions to this rule.
4. Micro-essays will be evaluated both as summaries of the assigned reading and as pieces of English composition. As summaries, they will be evaluated for conciseness, accuracy, precision, completeness, and perceptiveness in capturing the main points and the structure of the assigned reading. As compositions, they will be evaluated for legibility, organization, clarity, spelling, and grammar.

Hints. Micro-essays should reflect what you have understood in the reading, *and* how well you can communicate what you've understood in writing. As an aid to your reading, keep the following questions in mind; they will help you later when you try to summarize what you've just read. (These suggestions, however, are *not* intended as an "outline" to be followed when you compose your micro-essay.)

1. What issue or issues is being discussed in the reading? What is the author trying to establish? In short, why did s/he write this?
2. What conclusions does the author draw about the issues or problems s/he is writing about?
3. What arguments does s/he present for those conclusions?
4. What are the main points of these arguments?

Then:

5. Outline your essay. Write a draft. Make sure that you've included all the relevant points. Then try to compress it to the required length.
6. Omit needless verbiage. Clear out all unnecessary underbrush.
7. Revise your work. One revision is a *must*; frequently more than one will be necessary. Improve phrasing, eliminate anything unnecessary, clarify.

Miscellaneous Ideas

Recitals - I require that all students meet with me for a "Recital" early in the term. This requirement insures that students have a solid grounding in the central problems early in the course, and the individual contact allows me to make specific suggestions tailored to the individual's needs, problems, and concerns. Here are the instructions that appear on a typical syllabus: "Be able to state the entire argument of *Meditation I*, and to recite it informally to me, without relying on the text or notes. Set up a meeting date and time by the date shown on the syllabus." (WEM)

Thought questions - In addition to taking a midterm examination and a final examination, each student works on one or two "thought questions" (examples listed below) which are presented orally in class and discussed. The questions are controversial; the student is graded on the case s/he makes for his/her view, not on the view s/he takes. Examples:

Is there anything so certain that no reasonable person could doubt it?

Can we know what another is thinking?

What reasons have we for believing that there are physical objects?

Is knowledge of the past possible?

(CB)

Dialogues - Many philosophy instructors teach their classes by using vigorous, structured discussions, where a thesis is presented, a counter-example generated, and then the thesis is revised to deal with the counter-example. Using a dialogue format for exam questions encourages students to engage in that same vigorous process in their essays. The following are some sample dialogue questions:

1. Write an imaginary dialogue between Descartes and a "hybrid" character, Ausmates (pronounced Aus-ma-TEEZ), who is familiar with everything said by Austin, Bouwsma, and Socrates in our assigned reading. The dialogue takes place as Descartes and Ausmates are walking along the river from IUSB to Farmers' Market.

- a. (counts one-quarter) In the first part of the dialogue, have the two speakers work together to answer the question:

Suppose that one person knows that S , whereas another person believes that S but does not know that S , even though the proposition " S " is true. In what way or ways does the second person differ from the first? (Be sure that your answer holds true no matter what the proposition " S " is).

- b. (counts three-quarters) The remainder of your dialogue should deal with the following:

- i. While they are walking, Descartes and Ausmates meet an extraterrestrial being. He speaks and understands English. He is sometimes taken in by perceptual illusions. He is like human beings in other ways as well, except that he neither sleeps nor dreams. He does not have the words 'dream' and 'dreaming' as part of his vocabulary. Descartes and Ausmates explain the use of these words to the extraterrestrial. Have them do this in your dialogue.

- ii. Have Descartes present the strongest case possible for answering 'yes' to the following question:

Does the human phenomenon of dreaming provide some reason for doubting the truth of the proposition, "There are trees on the bank of the river"?

Have Ausmates question and criticize Descartes from the standpoint of a philosopher who takes the "indirect approach" to

combating skepticism. Let your own position be made clear by how the dialogue goes.

- iii. Are dreams illusions? (to answer this, you will have to do some things to clarify the concept of an illusion).

In writing this 3-5 page paper, you should show that you have understood the class presentations and the assigned readings, and that you have done some thinking of your own about the issues in question. Try to put things in your own words. You may use a limited amount of material quoted directly from the book--no more than one-quarter of the paper--but every passage copied out of the book (or another source) must be enclosed in quotation marks followed by a page reference in parentheses. (AN)

2. It is late and you are trudging home from the Library, having spent hours studying epistemology. Suddenly you see a crowd of people surrounding two rather oddly dressed men who are engaged in a very strenuous dispute. Because you are curious, you join the crowd and discover, much to your surprise, that the disputants are none other than Rene Descartes and Francis Bacon.

As you join the group, you hear Bacon say, "There was but one course left. . .to try the whole thing anew upon a better plan, and to commence a total reconstruction of sciences, arts, and all human knowledge, raised upon the proper foundations." At this point, Descartes interrupts. Describing his own intellectual work, he says, ". . . I was convinced of the necessity of undertaking once in my life to rid myself of all the opinions I had adopted, and of commencing anew the work of building from the foundation, if I desired to establish a firm and abiding superstructure of the sciences."

During the course of the afternoon, they discuss a whole range of topics, most notably the following: the nature of those foundations, methods for arriving at them, the reliability of the senses, sources of error, and the nature of human knowledge. After the "battle" is over, you congratulate yourself on your luck, because it just so happens you have a take-home test in your theory of knowledge class which requires you to write a description and an analysis of such a conversation. Do so. (MAC)

SAMPLE ASSIGNMENTS

Paper Topics

1. In an essay of 4-8 typed, double-spaced pages, discuss the aspects listed below of the Gettier counter-example to the justified true belief theory of knowledge.
 - a) Make up your own scenario to illustrate the problem, incorporating both the inference pattern of the ordinary teacher and the clever teacher.
 - b) Be careful to point out exactly what chain of reasoning supports the belief in question, and whether each piece of evidence is true or false.
 - c) State why the justification of the belief might plausibly be said to be complete.
 - d) Show how Lehrer's fourth condition of knowledge blocks the counter-example (or fails to do so).
 - e) State clearly how in the second case the belief "depends on" rather than is deduced from, a false statement.
 - f) Do you believe that one can be completely justified in believing something when the belief "depends on" a false statement? (CJM)

2. In an essay of 4-8 typed, double-spaced pages, discuss the aspects listed below of Chisholm's theory of justification.
 - a) Pick some ordinary perceptual propositions which you think you know, and which involve properties other than sensible characteristics of an external object. Example (what else?): The cat is on the roof.
 - b) Be sure to describe the circumstances under which the knowledge claim is made.
 - c) Point out what constitutes your evidence for that proposition, and at what level your evidence stands (using Chisholm's scheme) before the application of rule (G).
 - d) Apply rules (G), (H), and (I) to show that your proposition is evident. Be careful to state what inductive hypotheses you use.

- e) Be sure to mention whether or not you have used any self-presenting propositions, and whether you think their use (if made) is essential.
 - f) Do you think that Chisholm's rules really do establish that your proposition is one which fits his definition of "evident"? (GJM)
3. In an essay of 4-8 typed, double-spaced pages, your task is to make a rudimentary application of Lehrer's full conception of complete justification.

In your first paper, you constructed a scenario in which a person uses probabilistic reasoning in order to completely justify a belief (which failed to satisfy the fourth condition of knowledge). You stated in intuitive terms why that person was completely justified. This time, use the same example and show why the person was completely justified according to Lehrer's conception of a corrected doxastic system.

- a) Sketch the epistemic field which is taken into consideration (ignore the mechanism of disjunctive normal form, and consider only those beliefs which the person believes are negatively relevant).
- b) Assign probabilities to each of the beliefs within the field.
- c) Show how the system is corrected.
- d) Comment on whether the mechanism for generating justification in this way yields complete justification.
- e) If necessary, amend your original example to best illustrate Lehrer's way of arriving at complete justification. (GJM)

Exam Questions

1. Sketch the main lines of Lehrer's attack on foundationalist theories of justification. You should consider Lehrer's reply to the foundationalists' regress argument as well as the *general* responses to the types of foundationalist theories outlined in chapters 4-6. You will obviously have to omit much detail, so be careful to include what you consider to be the basic strategy employed against foundationalism. (GJM)
2. What are the main points of contrast between explanatory coherence theory and the subjective coherence theory? Why does Lehrer (as a disinterested seeker of the truth) take his own theory to be superior? Could the subjective coherence theory be subjected to similar criticisms? (GJM)

3. In chapter 6, Lehrer claims that the foundationalist cannot base his/her program on probabilities, yet he thinks they can be employed in the subjective coherence theory. What features of the two kinds of theories account for this disparity? (GJM)
4. How does Lehrer attempt to use the concept of the verific alternative to solve cases of justified true belief without knowledge? Does the use of the verific alternative capture the condition laid down on p. 21? Show how it solves the Tom Grabit example, and indicate whether you think this is a good solution. (GJM)
5. Clifford, Huxley and others have taken a rather extreme view that it is immoral to believe on insufficient evidence, and the skeptics have been to quick to point out that we never have sufficient evidence to stop all doubt. But Charles Saunders Peirce asks, "Do you call it *doubting* to write down on a piece of paper that you doubt?", and his words prompt a critical question: aren't the skeptics setting up conditions for belief that are impossible to meet? What is the connection between belief and doubt? If I doubt something, am I saying a belief here would be unfounded? wrong? false?, etc. And if I do not doubt something, am I saying my belief is true? Write an essay in which you discuss these and related issues. (MAC)
6. "In a nutshell, the doctrine about knowledge, "empirical" knowledge, is that it has *foundations*. It is a structure the upper tiers of which are reached by inferences, and the foundations are the *data* on which these inferences are based. . .the way to identify the upper tiers of the structure of knowledge is to ask whether one might be mistaken, whether there is something that one *can doubt*: if the answer is Yes, then one is not at the basement. And conversely, it will be characteristic of the *data* that in their case no doubt is possible, no mistake can be made. So to find the data, the foundations, look for the *incorrigible*." (J. L. Austin, *Sense and Sensibilia*)

First, "unpack" this description of foundationalism, by explaining the various assumptions it makes about knowledge, certainty, and truth. Then, where possible, trace each of those assumptions to one (or more) of the philosophers we studied this semester. Be as specific and as detailed as possible; use (short) appropriate quotes from that philosopher to show why you believe he contributed to the assumption you have attributed to him. (MAC)

7. As is clear from considering its history, foundationalism developed as an answer to problems suggested by a particular definition of knowledge. First, explain what that definition of knowledge is, then discuss the specific problems it entails, and finally, explain how foundationalism seeks to resolve those problems.

Next, criticize foundationalism from the perspective of Montaigne, Hume and (the later) Wittgenstein. Do you see the beginning of an "anti-foundationalist" view in those philosophers? Discuss as specifically as you can what assumptions these three philosophers share that might be called "anti-foundationalist." (MAC)

8. How does Reid's Foundationalism differ from Descartes? What exactly are Reid's Foundations? How does Reid's Foundationalism avoid the skeptical objections to which Descartes' view seems vulnerable? (ME)
9. Explain Reid's argument for all our cognitive faculties being on a par with one another and being equally trustworthy. Do you think that Reid's contention, that to be consistent either we must trust all our faculties or we must trust none of them, is legitimate? Defend your view. (ME)
10. Is there any practical difference between saying something is evident and saying that we are so certain of its truth that we don't see how anybody could doubt it? If not, can knowledge be equated with certainty after all? Discuss, being careful to offer definitions, justifications, arguments and counter-arguments where needed. (MAC)
11. Use Clifford's shipowner case to construct an adequate evidence condition (i.e., what counts as adequate evidence). He thinks the origin of one's belief is relevant to whether one has the right to be sure or not. Which sorts of origins are acceptable and which are not? Why/why not? Are beliefs actions? Why/why not? Clifford holds that to believe when one does not have the right to believe is not just to fail to have knowledge but also to act immorally. Why? Supposedly, William James would agree that Clifford's shipowner does not have the right to believe. Exactly how, on James' view, does the shipowner case differ from cases in which one has the right to believe on no evidence (i.e. from a genuine option, on his view)? What good does it do to worry about exactly how knowledge should be defined? (MAC)
12. What is an adequate reason for doubting? Is it enough to say that because not-*p* is logically possible, I can't be sure that *p* is true? What is the difference between 1) reasonable doubt, 2) unreasonable doubt and 3) logically possible doubt? Give examples of each and discuss. (MAC)

General Questions on Epistemology

Editor's Note: Judging from our curriculum meetings at the Institute, Keith Lehrer's *Knowledge* remains an enormously popular choice as a text for Theory of Knowledge courses across the country. For that reason, we have

decided to include a selection of questions written by Lehrer for a German edition of the text. A revised textbook edition of *Knowledge* is being prepared for publication by Westview Press for 1988. Until that edition appears, Lehrer, who is the copyright holder, hereby gives permission to anyone to reproduce portions of *Knowledge* as needed, for class use only.

Numbers in brackets refer to the relevant chapter in *Knowledge*.

1. Consider the following argument:

"In order to know something, we must be justified in believing it. To be justified we must have evidence. There is no justification without evidence. However, evidence must be something that we know to be true. Hence, to know that p , one must be justified in believing p on the basis of evidence q . But then one must know that q . To know that q , one must be justified in believing that q on the basis of r . But then one must know that r . And so forth. Thus, the assumption that we know anything leads to an infinite regress."

How would you reply to such an argument? Is it necessary to assume that there are basic beliefs to avoid the regress? Why/why not? [1]

2. How would you respond to someone who said the following?

"Either a theory of knowledge is a semantic theory concerning the meaning of the word 'know' or it is a learning theory about how people come to know what they do. There is nothing else concerning knowledge that justifies philosophical investigation. Thus, theory of knowledge reduces to either semantics or to learning theory, and in either case, is not a fruitful area for philosophical reflection." [1]

3. Consider the following claim:

"Truth is nothing but coherence with a system. This is easy to see in the following way. If I claim to know something, for example, that a major thermonuclear war would produce nuclear winter, my justification for this claim is the coherence between what I claim to know and a system of convictions about the effects of nuclear explosions. Justification is, therefore, coherence, and truth is justification. There is no knowledge without justification, and therefore, no truth without coherence with a system of convictions. Truth just is justification."

What errors occur in this argument? Is the connection between truth, justification, and coherence warranted? Is someone who holds a coherence theory of justification committed to a coherence theory of truth? Suppose everything said in the paragraph were correct. Would that imply that

truth cannot be eliminated in the sense in which the author of *Knowledge* claims that it can be eliminated? [2]

4. Suppose someone offers the following argument:

"It is often perfectly correct to say, 'S/he does not believe that, s/he knows it.' If it is correct to say that, then it is logically consistent to say it. Therefore, it is logically consistent to say that a person does not believe something that s/he knows. If, however, it is logically consistent to say that a person does not believe something that s/he knows, then the claim that a person knows something does not logically imply that s/he believes it."

How would you argue *against* that person? If you agree with the argument, how would you rebut the argument you just created? [3]

5. Consider the argument:

"Some have alleged that a foundation theorist is committed to the thesis that the truth of basic beliefs is somehow guaranteed. But a foundation theorist need not maintain this position. The foundation for a building may be solid and dependable without any guarantee that it may never collapse. In an earthquake or other special circumstances, the foundation may collapse and the building with it. In ordinary circumstances, however, the foundation is adequate to support the building. By analogy, basic beliefs may be adequate to support the edifice of knowledge without guaranteeing truth. In unusual circumstances, such as skeptics have imagined, they may fail to protect us from error, but in ordinary circumstances they will lead us to truth. They are, therefore, an adequate foundation."

Is this argument reasonable? How might one argue against it? [4]

6. Consider the following argument:

"When the skeptic argues that we do not know the things we all believe we know, that the bodies we see before us exist, for example, the skeptic has simply used the word 'know' in a different sense from the way the rest of us use the word. It is like when someone says that nothing is real and that everything is a dream. S/he has just used the words 'real' and 'dream' in a different sense than they are ordinarily used. There is, therefore, no factual disagreement. The disagreement is merely verbal."

How might one reply to this argument? How could one argue that the disagreement is not verbal? Is the argument correct? [5]

7. Consider the following argument:

"A foundation theorist can be fallibilist. S/he can admit that the justification we have for our basic as well as nonbasic beliefs does not guarantee truth. But s/he may affirm, nonetheless, that knowledge must have a foundation of basic beliefs. Such a theory leads to neither skepticism nor speculation."

Evaluate this theory. You might attempt to develop it in some detail and then critically evaluate it. Is such a theory possible? [6]

8. Consider the following argument:

"It is proposed by some philosophers that a person is completely justified in a belief just in case that belief coheres with a system of belief. This proposal will, however, lead to paradox. If a person argues that a belief is justified in this way, then s/he must show that the belief is justified by appealing to beliefs belonging to the required system as premises, but the premises themselves must be justified or the justification is useless. Whatever premises of the system are used to justify these further beliefs must be justified by other premises of the system, and so forth. It is clear that this will lead either to an infinite regress of justification or to circular justification. A regress or a circle are unsatisfactory, and the only way to avoid them is to affirm that there are first premises, that is, self-justified beliefs."

How might one reply to this argument? Is the reply satisfactory? [7]

9. Consider the following objection to the coherence theory:

"Justification is a matter of rationality. A belief is justified if and only if it is a rational belief. A belief is rational if and only if it is useful for the objectives of pursuing truth and avoiding error. The usefulness of a belief in this way is quite independent of any system of beliefs or coherence among beliefs, because whether a belief is true or erroneous is independent of the other things one believes. Truth and error are the determinants of rational as well as justified belief, and they are independent of coherence. Therefore, coherence is neither necessary nor sufficient for justified belief."

How would a coherence theorist reply to this? What is the relevance of epistemic utility to this argument? [8]

10. Consider the following argument:

"The coherence theory has two defects. In the first place, it is overly intellectual. It requires that we ascribe to people probabilities and beliefs that they have never entertained and might not understand. In the second place, it is insufficiently factual. What justifies our beliefs is the relation to the facts and the relation is causality. A belief that *h* is justified if and only if it is caused by the fact that *h*. It is, therefore, not the relation of a belief to other beliefs that makes them justified as the coherence theory contends. It is the causal relation to the facts."

How would a coherence theorist reply? Is the reply satisfactory? [8]

11. Consider the following argument:

"The coherence theory cannot give an adequate account of both perceptual and inferential belief, because it leads to a dilemma. Either coherence involves inference or it does not. If coherence is based on inference, then perceptual beliefs would turn out not to be justified, which is absurd, because they are not based on inference. If coherence is not based on inference, then no inferential beliefs would turn out to be justified, which is also absurd, because they are all based on inference. Either way, then, the coherence theory leads to absurdity."

How would the coherence theorist reply to this argument? What does the coherence theorist claim with respect to perception and inference? [9]

12. Consider the following argument:

"If there is some chance that a person might err in what s/he believes, then the person lacks knowledge. There is always some chance that a person might err in what s/he believes. Therefore, we lack knowledge."

How can a coherence theorist reply to this argument? Which premise of the argument would s/he reject? Why? [10]

13. Consider the following argument:

"Skeptics have argued that it is logically possible that perceptual beliefs might be in error. The mere logical possibility of error does not refute a claim to justification and knowledge, however. Moreover, there is no stronger premise the skeptic may appeal to in order to reach his/her conclusion. There is no more than a logical possibility that our perceptual beliefs are in error."

How might a defender of skepticism reply to this argument? [10]

APPENDIX A

MEMBERS, COUNCIL FOR PHILOSOPHICAL STUDIES

1983-1984

Judith Thomson, Chair MIT	Keith Lehrer University of Arizona
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Jaakko Hintikka Florida State University	

1984-85

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(continued)

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1985-86

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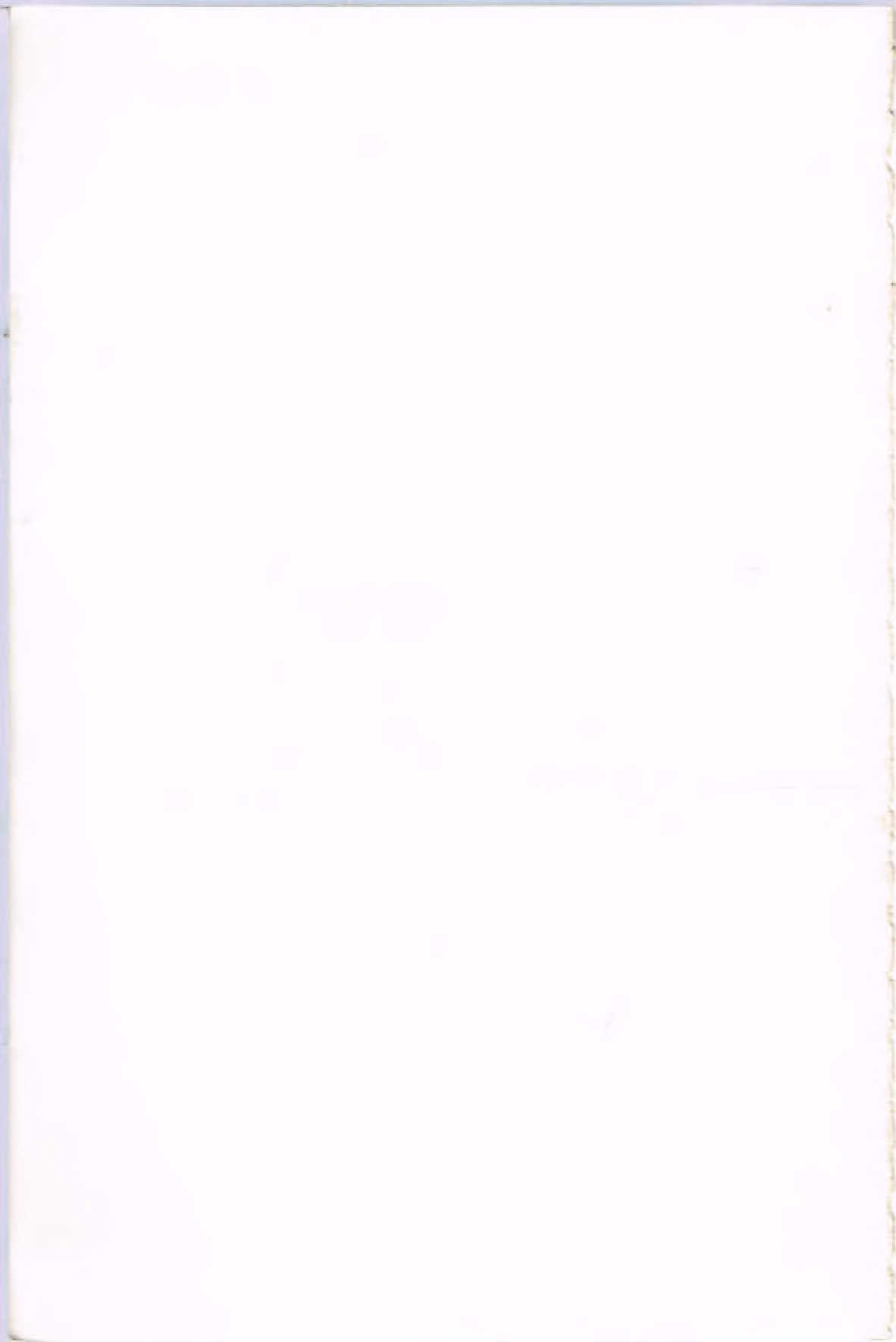
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Susan Wolf
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APPENDIX B

COUNCIL PUBLICATIONS

- 1975 Medical Ethics Film Review Project (out of print)
- 1977 Professional Responsibility in the Law, A Curriculum Report for the Institute on Law and Ethics
- 1981 Medieval Philosophy in the Philosophy Curriculum
- 1981 Phenomenology and Existentialism: Continental and Analytical Perspectives on Intentionality in the Philosophy Curriculum (out of print)
- 1982 The Council for Philosophical Studies, A History 2nd Edition
- 1983 Philosophy of Biology in the Philosophy Curriculum
- 1983 Psychology and the Philosophy of Mind in the Philosophy Curriculum
- 1984 Kantian Ethical Thought, A Curricular Report and Annotated Bibliography
- 1986 Teaching Theory of Knowledge